Practical Blockchain Opportunities in Real Estate

Dave Conroy

2017 RESO™ TECHNOLOGY SUMMIT
ORCHESTRATING COLLABORATION & INNOVATION

SPEAKER

Dave Conroy

NAR

dave@crtlabs.org

DAVE CONROY| R&D LAB ENGINEER

CRT LABS | NATIONAL ASSOCIATION OF REALTORS

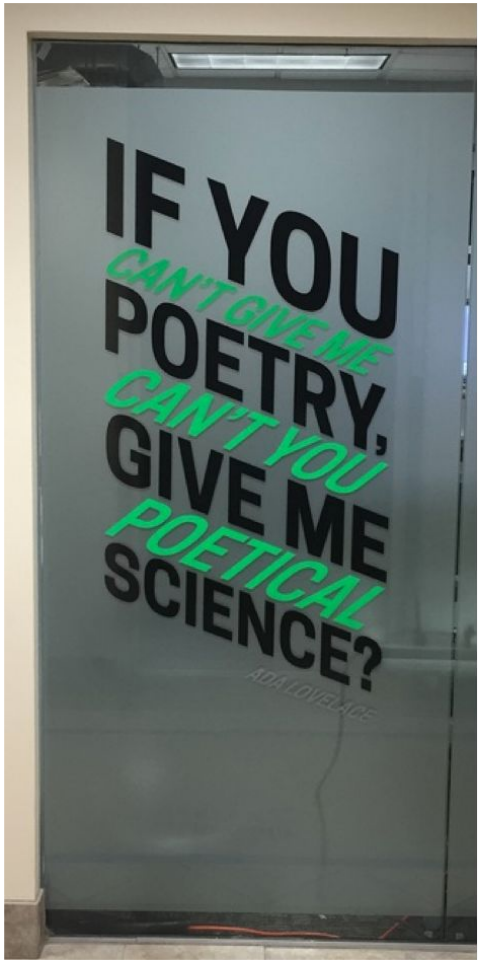
What is CRT Labs?

NATIONAL ASSOCIATION of REALTORS®

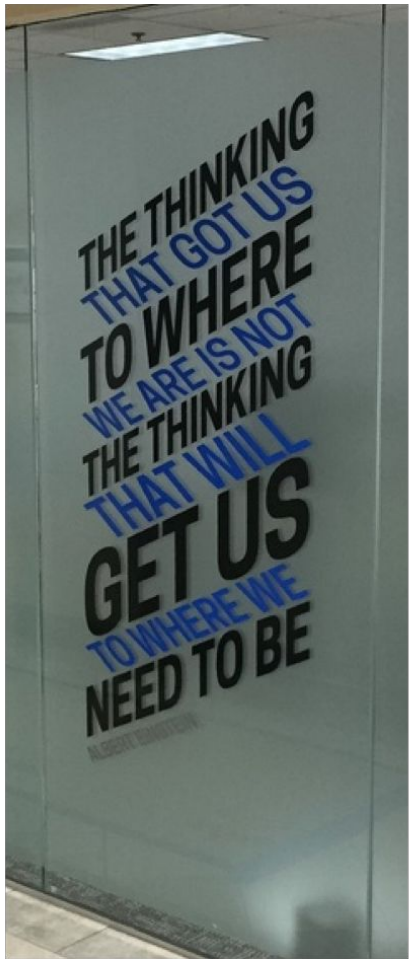
CRT LABS

4th Floor
Across from
Elevators

430 N. Michigan Avenue
Chicago, IL 60611

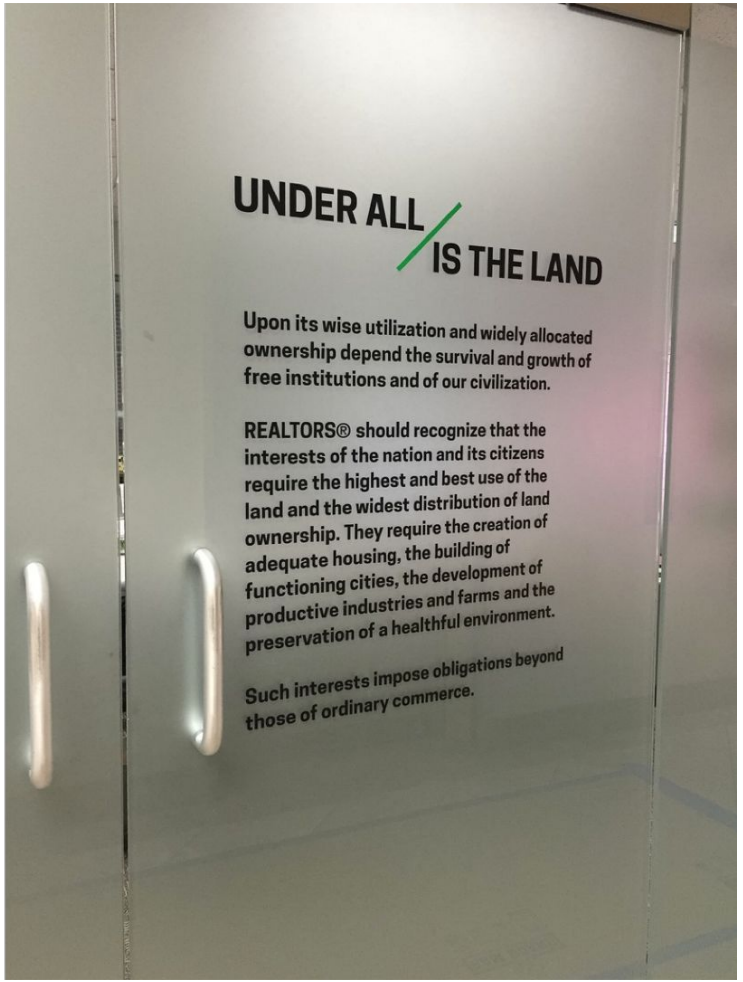

IF YOU CAN'T GIVE ME POETRY, CAN'T YOU GIVE ME POETICAL SCIENCE?
ADA LOVELACE

THE BEST WAY TO PREDICT THE FUTURE IS TO INVENT IT


THE THINKING THAT GOT US TO WHERE WE ARE IS NOT THE THINKING THAT WILL GET US TO WHERE WE NEED TO BE

THE FUTURE IS ALWAYS BEGINNING NOW

CRT LABS


UNDER ALL IS THE LAND
Upon its wise utilization and widely allocated ownership depend the survival and growth of free institutions and of our civilization.
REALTORS® should recognize that the interests of the nation and its citizens require the highest and best use of the land and the widest distribution of land ownership. They require the creation of adequate housing, the building of functioning cities, the development of productive industries and farms and the preservation of a healthful environment.
Such interests impose obligations beyond those of ordinary commerce.

Under all is the land. Upon its wise utilization and widely allocated ownership depend the survival and growth of free institutions and of our civilization. REALTORS® should recognize that the interests of the nation and its citizens require the **highest and best use of the land** and the widest distribution of land ownership. They require the creation of adequate housing, the **building of functioning cities**, the development of productive industries and farms, and the **preservation of a healthful environment.**

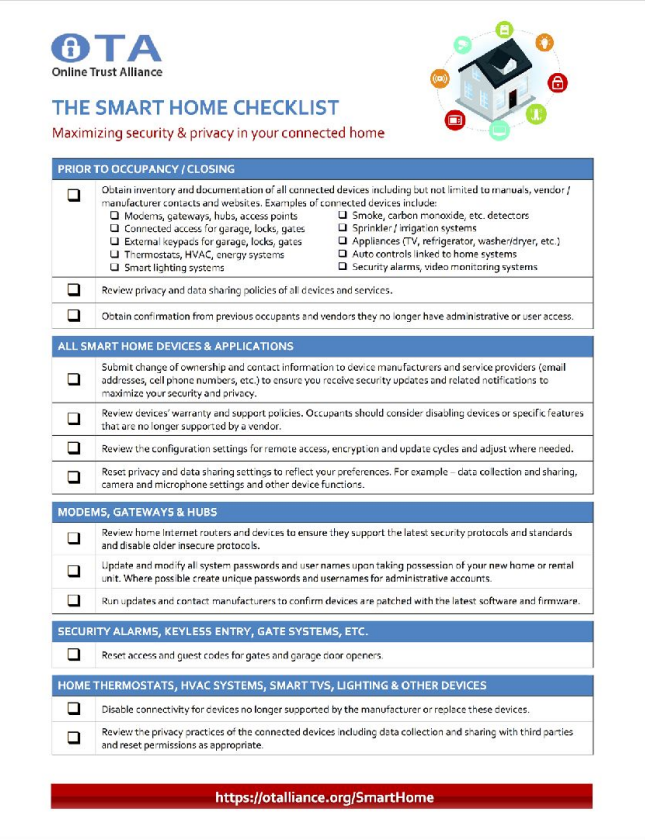
NATIONAL ASSOCIATION of REALTORS®

How does CRT Labs provide value?

Education | Advocacy | Innovation

Education | Advocacy | Innovation

https://crtlabs.org



OTA
Online Trust Alliance

THE SMART HOME CHECKLIST

Maximizing security & privacy in your connected home

PRIOR TO OCCUPANCY / CLOSING

- ❑ Obtain inventory and documentation of all connected devices including but not limited to manuals, vendor / manufacturer contacts and websites. Examples of connected devices include:
  - ❑ Modems, gateways, hubs, access points
  - ❑ Connected access for garage, locks, gates
  - ❑ External keypads for garage, locks, gates
  - ❑ Thermostats, HVAC, energy systems
  - ❑ Smart lighting systems
  - ❑ Smoke, carbon monoxide, etc. detectors
  - ❑ Sprinkler / irrigation systems
  - ❑ Appliances (TV, refrigerator, washer/dryer, etc.)
  - ❑ Auto controls linked to home systems
  - ❑ Security alarms, video monitoring systems
- ❑ Review privacy and data sharing policies of all devices and services.
- ❑ Obtain confirmation from previous occupants and vendors they no longer have administrative or user access.

ALL SMART HOME DEVICES & APPLICATIONS

- ❑ Submit change of ownership and contact information to device manufacturers and service providers (email addresses, cell phone numbers, etc.) to ensure you receive security updates and related notifications to maximize your security and privacy.
- ❑ Review devices' warranty and support policies. Occupants should consider disabling devices or specific features that are no longer supported by a vendor.
- ❑ Review the configuration settings for remote access, encryption and update cycles and adjust where needed.
- ❑ Reset privacy and data sharing settings to reflect your preferences. For example – data collection and sharing, camera and microphone settings and other device functions.

MODEMS, GATEWAYS & HUBS

- ❑ Review home Internet routers and devices to ensure they support the latest security protocols and standards and disable older insecure protocols.
- ❑ Update and modify all system passwords and user names upon taking possession of your new home or rental unit. Where possible create unique passwords and usernames for administrative accounts.
- ❑ Run updates and contact manufacturers to confirm devices are patched with the latest software and firmware.

SECURITY ALARMS, KEYLESS ENTRY, GATE SYSTEMS, ETC.

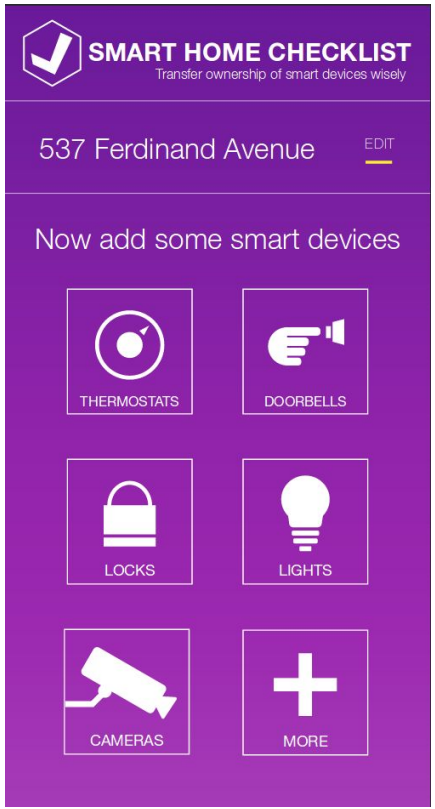
- ❑ Reset access and guest codes for gates and garage door openers.

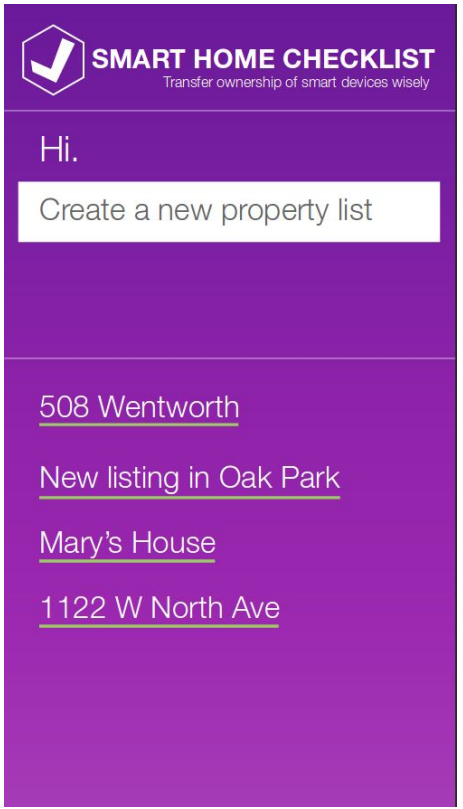
HOME THERMOSTATS, HVAC SYSTEMS, SMART TVS, LIGHTING & OTHER DEVICES

- ❑ Disable connectivity for devices no longer supported by the manufacturer or replace these devices.
- ❑ Review the privacy practices of the connected devices including data collection and sharing with third parties and reset permissions as appropriate.

https://otalliance.org/SmartHome

Smart Home Checklist





Smart Home Simplified

What Are Smart Locks?

Smart locks augment existing deadbolt systems through wireless protocols, like Bluetooth, in order to allow your smart phone to become a "key" into your home. Using your phone, you can unlock your door instead of fumbling for your keys, assign digital "keys" to visitors, and check the status of your lock when you're not home.

What are the benefits of smart locks?

Smart locks add convenient features to your locks, including hands-free ways to lock your doors, temporary access for visitors, and the ability to track who comes and goes (and when). If you find yourself having a lot of keys made, the ability to create digital keys saves you time

How do smart locks work?

By using wireless protocols, like Bluetooth, your phone links to your smart lock and becomes a "smart key." This key is unique to your phone, and you can control the security of your home in a way that giving away a traditional key would not allow. For example, if you have a

What are the challenges of smart locks?

A lot of people will think smart locks are easily hackable, and thus less secure than a traditional deadbolt. But since smart locks also include deadbolts, they are no more "defeatable" than traditional locks are. Smart lock manufacturers are aware of hacking risks, and some have done

Smart Home Glossary

Hearing a lot of buzzwords around the smart home space? What's a geofence? What's a hub? What is IoT? Check out our glossary and find out what these terms and many more mean for smart devices. This list will grow over time so check back frequently. Use it to quickly catch up on the commonly used phrases and terms. If you have any questions or suggestions, send us an email! Thanks!

Bluetooth LE/ Bluetooth Smart:

A wireless protocol that is popular among smart home devices. Compared to classic bluetooth, it is designed to use considerably less power while maintaining a similar range. BLE is not only aimed at the smart home, but also at fitness, healthcare, and security industries.

Cloud-to-Cloud:

Many smart home products use cloud services for their core functionality. Although it is not ideal having your devices relying on an internet connection, it does sometimes allow for increased interoperability. Two devices in the same room might not be able to communicate directly. Instead, messages are sent back and forth through their respective cloud services over the internet. This is known as "cloud to cloud" and is becoming a popular way for hardware vendors to increase compatibility.

Geofence:

A virtual perimeter for the real world. Using your WiFi, Bluetooth, or GPS radios, your Smart Home software can trigger events based on your physical location. For example, you can use a geofence to automatically turn off your lights when you leave for the day.

Quick Links

Smart Home Checklist

Smart Thermostat Tearsheet

Smart Home Glossary

Smart Home and IoT FAQ

Recent Posts

#003 – Things Thursday – Triby Uses Amazon Echo integration and Always On Microphones & More!!

#002 – Things Thursday – Forget Wearables, Here Come Implantables and Standards!!

#001 – Things Thursday – AI is Here, are You Ready?, Stopping the Revolv-alution, & more

CRTLabs On the Road for April 2016 – Las Vegas, Utah, San Antonio & more!!

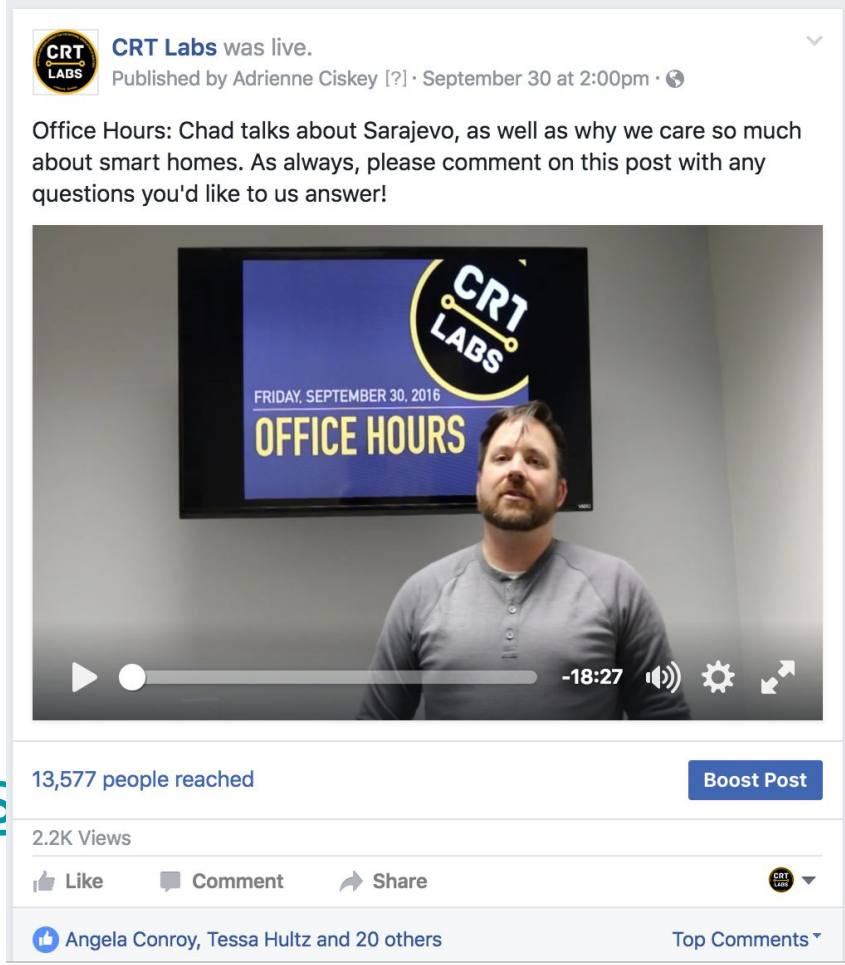
#000 – Things Thursday – A New Series

OFFICE HOURS:

Friday at 2p Eastern

on our Facebook Page:

https://facebook.com/crtlabs



Education | **Advocacy** | Innovation

NATIONAL
ASSOCIATION of
REALTORS®
REALTOR®

URBAN
CENTER FOR
COMPUTATION
AND DATA

gogo

NYU

accenture

INFOBRIGHT

CITY OF CHICAGO
INCORPORATED 4TH MARCH 1837

CISCO

IoT
COUNCIL
POWERED BY ITA

at&t

BMW

ita
SCALING
TECH

THE UNIVERSITY OF
CHICAGO

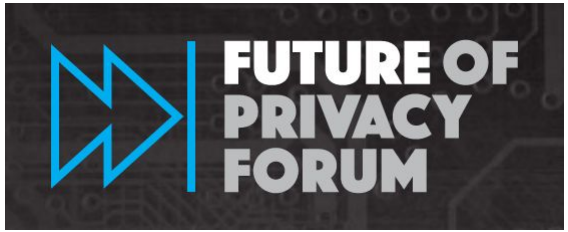
First Analysis

CATERPILLAR®

ZEBRA

go

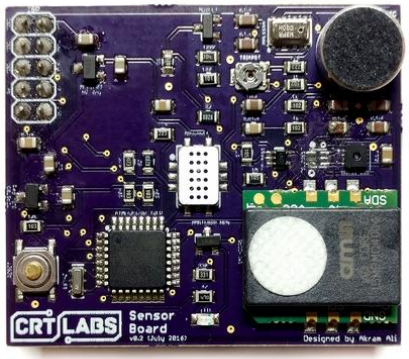
Privacy & Security

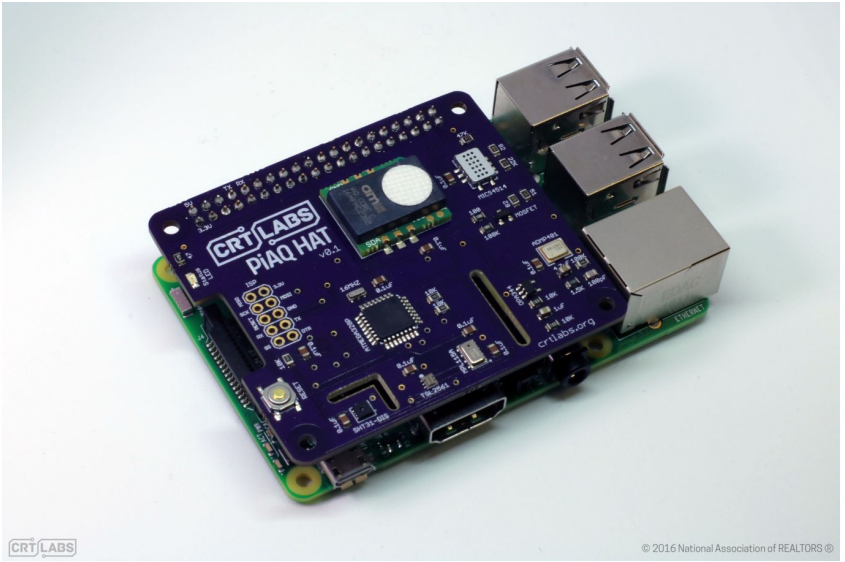


Education | Advocacy | **Innovation**

Hardware

Hardware And Software Design





Environmental Quality Sensors built by CRT Labs

Open Source

Open Hardware

Affordable Indoor air quality sensor

Measures:

- Temperature
- Humidity
- VOC's
  - Paint Fumes
  - Formaldehyde
  - Benzene
- CO , CO2
- Barometric Pressure
- Light
- NO2
- Sound

PiAQ Raspberry Pi Hat:

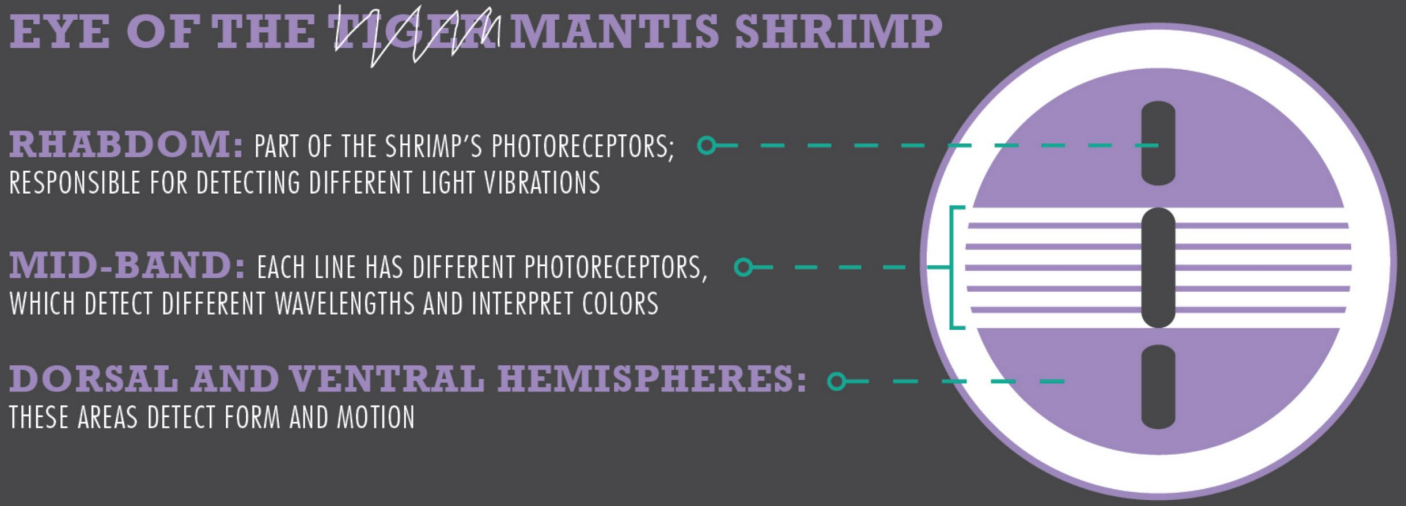
- Same measurements
- Built for hobbyists
- Sending one to **NASA** for use in project
- Latest version uses smaller sensors for CO_2

http://piaq.io/

We have 3 color receptor cones.

Red
Green
Blue

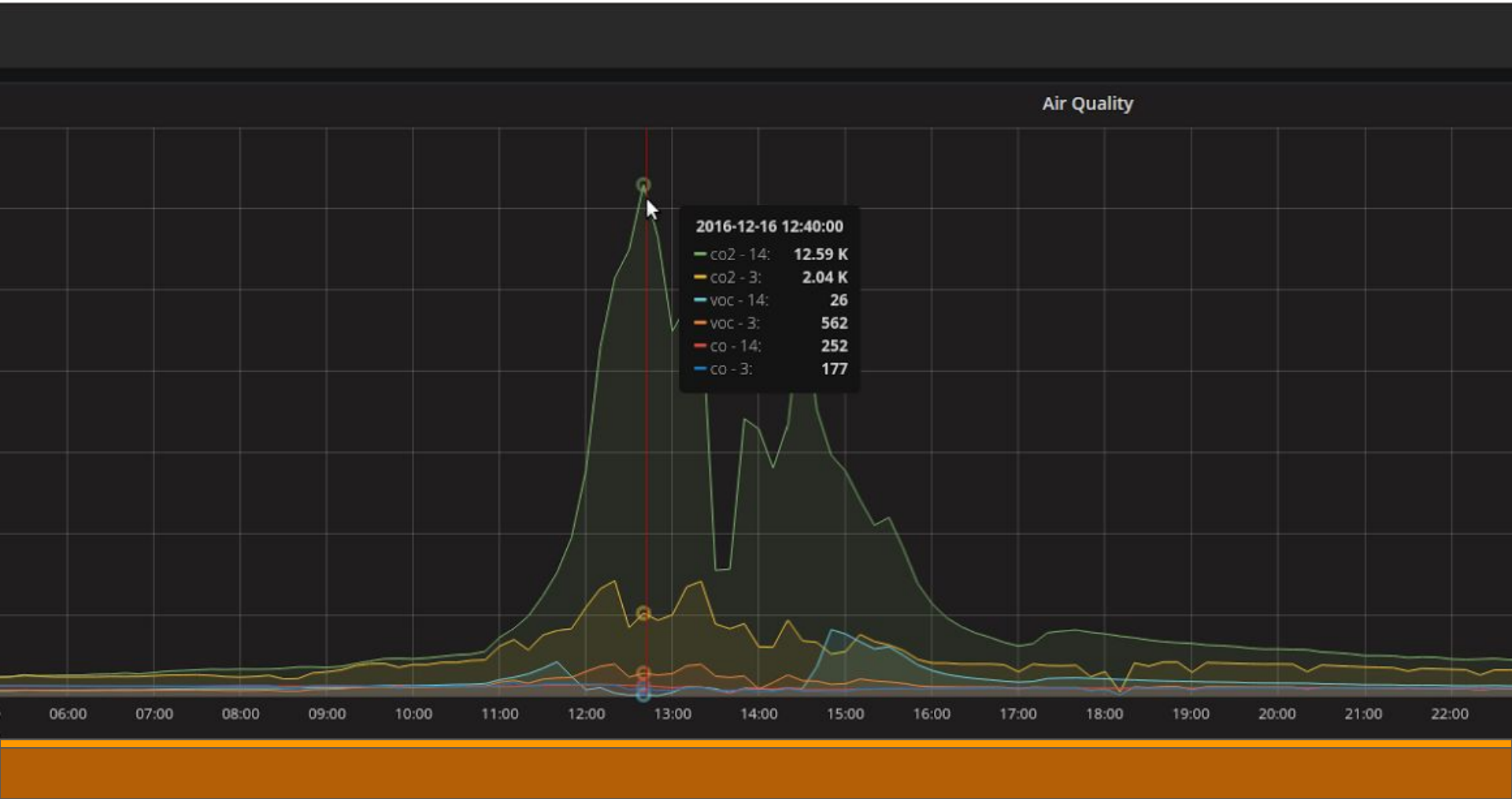
Mantis Shrimp have **16**.



They can see 10x better than we can.

42112
FOOD
YARD

OK


Air Quality
2016-12-16 12:40:00
co2 - 14: 12.59 K
co2 - 3: 2.04 K
voc - 14: 26
voc - 3: 562
co - 14: 252
co - 3: 177
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00

Education | Advocacy | **Innovation**

Blockchain Research

What are **Blockchains**?

Blockchains are a new information management technique

But what do **Blockchains** actually do?

Simply put, Blockchains provide a verifiable, trustworthy record of **events or transactions**.

Blockchains are database that maintain a continuously growing list of ordered entries called **Blocks**.

Each **Block** contains a timestamp and a link to a previous **Block** forming a **Chain**

What are the benefits of using **Blockchains**?

Blockchains Benefits:

- They are append only
- Each participant retains a copy of the data
- No Single Point of Failure
- Blockchain’s allow for Smart Contracts

What is NAR interested in blockchain?

Why is NAR Focusing on Blockchain?

- Blockchains could provide immutable and accurate information with verifiable history on properties
- The risk of fraud or human error could be greatly reduced
- Smart Contracts running on top of the Blockchain could even perform the appropriate audits automatically as part of an asset transfer.

Why is NAR Focusing on Blockchain?

- We believe it is has the potential to be one the most impactful technologies of the next few decades

- After Fin-tech and Supply Chain Management, the Real Estate market will be the target for entrepreneurs trying to disrupt traditional business models

Simply put, Blockchains ___ :

- Greatly reduce cost of business
- Reduce risk for REALTORS and clients

What about Privacy? Security? Who has access?

- Enterprise blockchain solutions are trending towards private, permissioned chains
- Industry giants like Microsoft, IBM are backing open source projects to tackle needs of businesses (Hyperledger, Corda, Ethereum)

What is NAR's progress to date?

Progress:

- Creating practical applications to be used as case studies
- Published white papers
- Released Source Code to attract others

Engagement Tracker / The Block R

Goals for Engagement Tracker:

- Track Committee and Education Records of REALTOR members on a distributed **private** ledger
- Serve as **proof of concept** for management of information between multiple concerned parties at different levels of administrative access
- Demonstrate how blockchains ***could*** provide value to National, State, Local, and REALTOR Members
- Eventually modeled after existing business relationships (POE/NRDS)

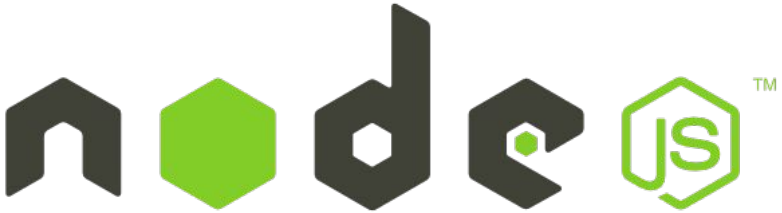
Goals for Engagement Tracker Demo Cont'd :

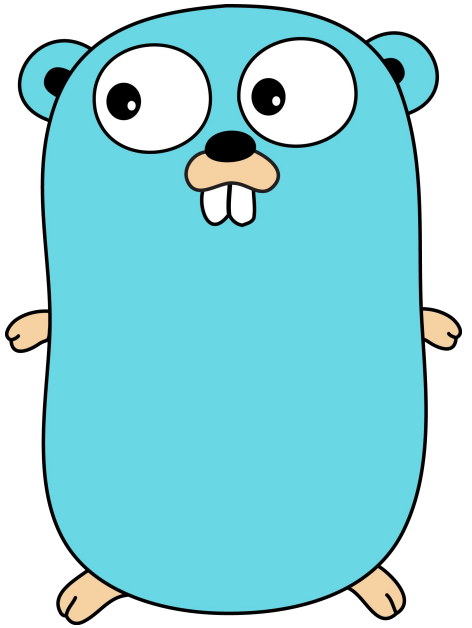
- Show how a blockchain solution could be automatically updated via API's without the need for technical expertise or familiarity with blockchain.
- Engagement tracker does not affect real estate transactions, public records, or anything that could stigmatize the underlying technology if the project was not successful.

Goals for Engagement Tracker Demo Cont'd :

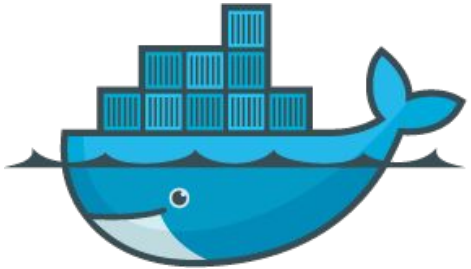
- Most importantly, it was designed to be used as a boilerplate template.

Tech Stack (1/2)





Tech Stack (2/2)



docker

HYPERLEDGER

RESO®

python

code.crtlabs.org

Lets **jump** into the demo.

Recap:

- Showed how information could be inserted, updated, queried through a blockchain and shared among different levels
- Demonstrated REST API's for insertion but also for synchronization for easy maintenance
- Potential to be "Plug and Play"
- Essentially a Template for higher impact projects

How can RESO further participate in Blockchain Research?

Immediate Possible Use Cases:

- Decentralized Registry of PUIDs
- Smart Contracts running on top of registry/ledger would ensure uniqueness as well as generate PUIDS when applicable
- RESO Could define payload

dave@crtlabs.org

Immediate Possible Use Cases:

- Standardized Event Catalog (R&D Workgroup)
- Blockchain Based Registry of Events
- Smart Contracts to handle creation, update, delete, query based off RESO Standard

dave@crtlabs.org

Stay in the Loop:

- Read our white papers! http://crtlabs.org/
- Check out IBREA on LinkedIn (International Blockchain Real Estate Association)
- Visit CRT Labs in person or online

dave@crtlabs.org

Stay in the Loop:

- Help participate in development of prototypes

dave@crtlabs.org

THANK YOU – QUESTIONS?

@conroydave
@crtlabs
https://crtlabs.org
dave@crtlabs.org
dconroy@realtors.org

Want more live Demos?