CEVA

DIGITIMES

12th YEAR

CEVA TECHNOLOGY
SYMPOSIUM SERIES

From IoT@home to AI@home:

The next phase of growth in smart home market

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DIGITIMES

Outline

- IoT@home: 3 steps to create smart home market
  - digitalized and connected single device can activate automatically and be remotely controlled
  - devices communicate with each other, with users able to customize services
  - combine applications into single service to provide paid service
- AI@home: 3 steps of redefining "smart“
  - AI HMI (human machine interface) as smart
  - AI for automation as smart
  - AI for creating business model as smart
- Conclusion

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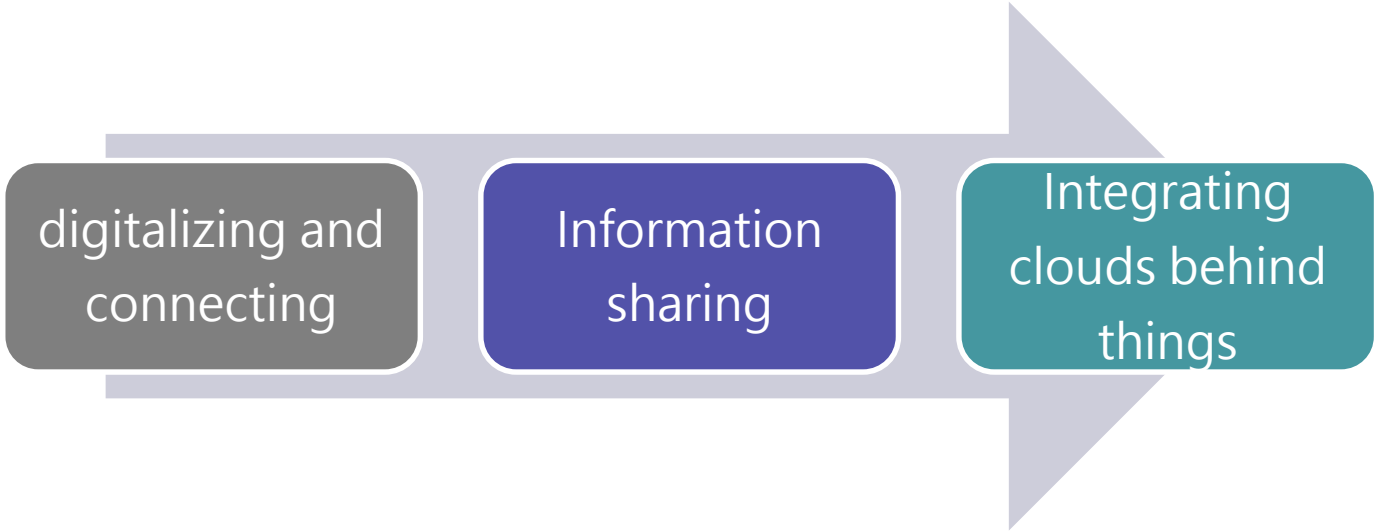
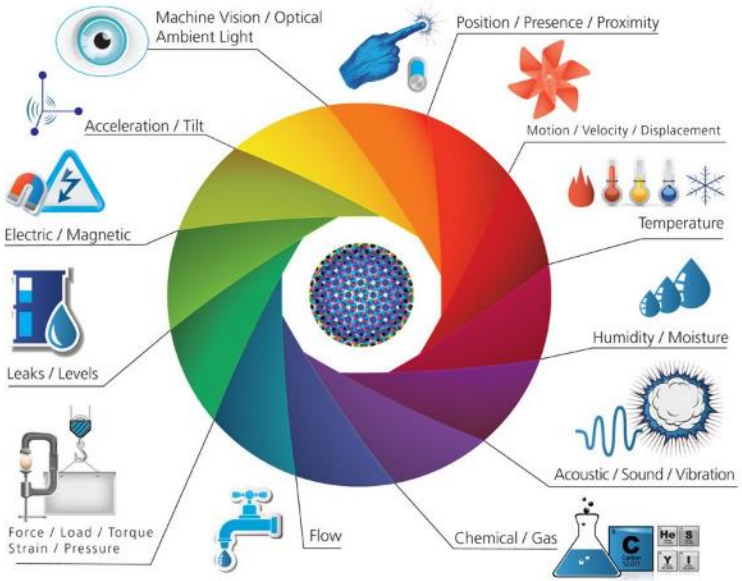
IOT@HOME:
3 STEPS TO CREATE SMART HOME MARKET

IoT: 3 Steps to Create Smart Home Market

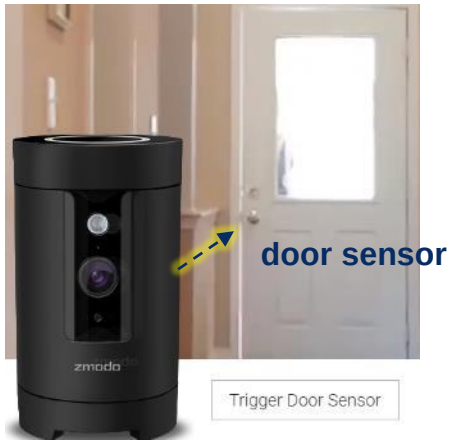


First step: Make things digital and connected

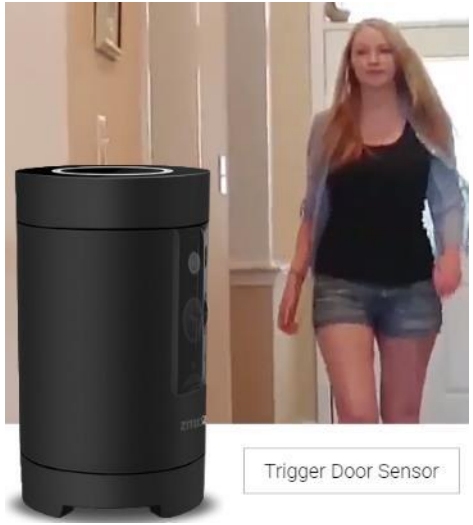


- setup schedule
- more complicated functions
- Remote control
- Automatic control

IoT Smart Home: Sensor Triggers 360° Rotating Camera



Zmodo Pivot 360攝影機

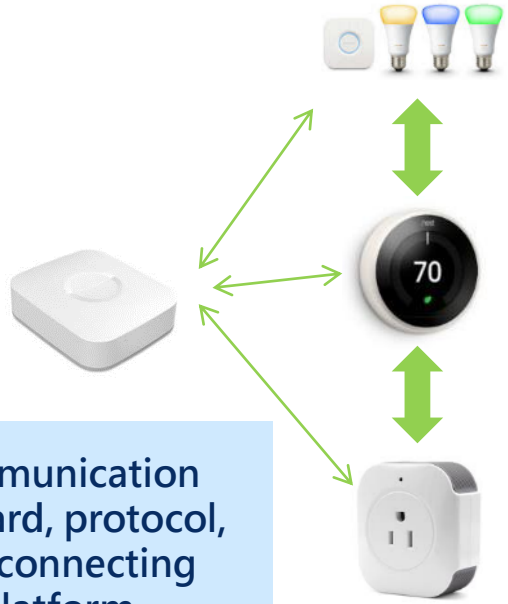


Unnecessary intelligence?

Porkfolio piggy bank智慧撲滿：
- Track balance
- Set financial goals
- Protect savings from shenanigans

Quirky Egg Minder蛋架
- To know how many eggs left at home
- LED lights indicate the oldest egg

Second Step: Going smart by sharing data among each other



Communication standard, protocol, API, connecting platform

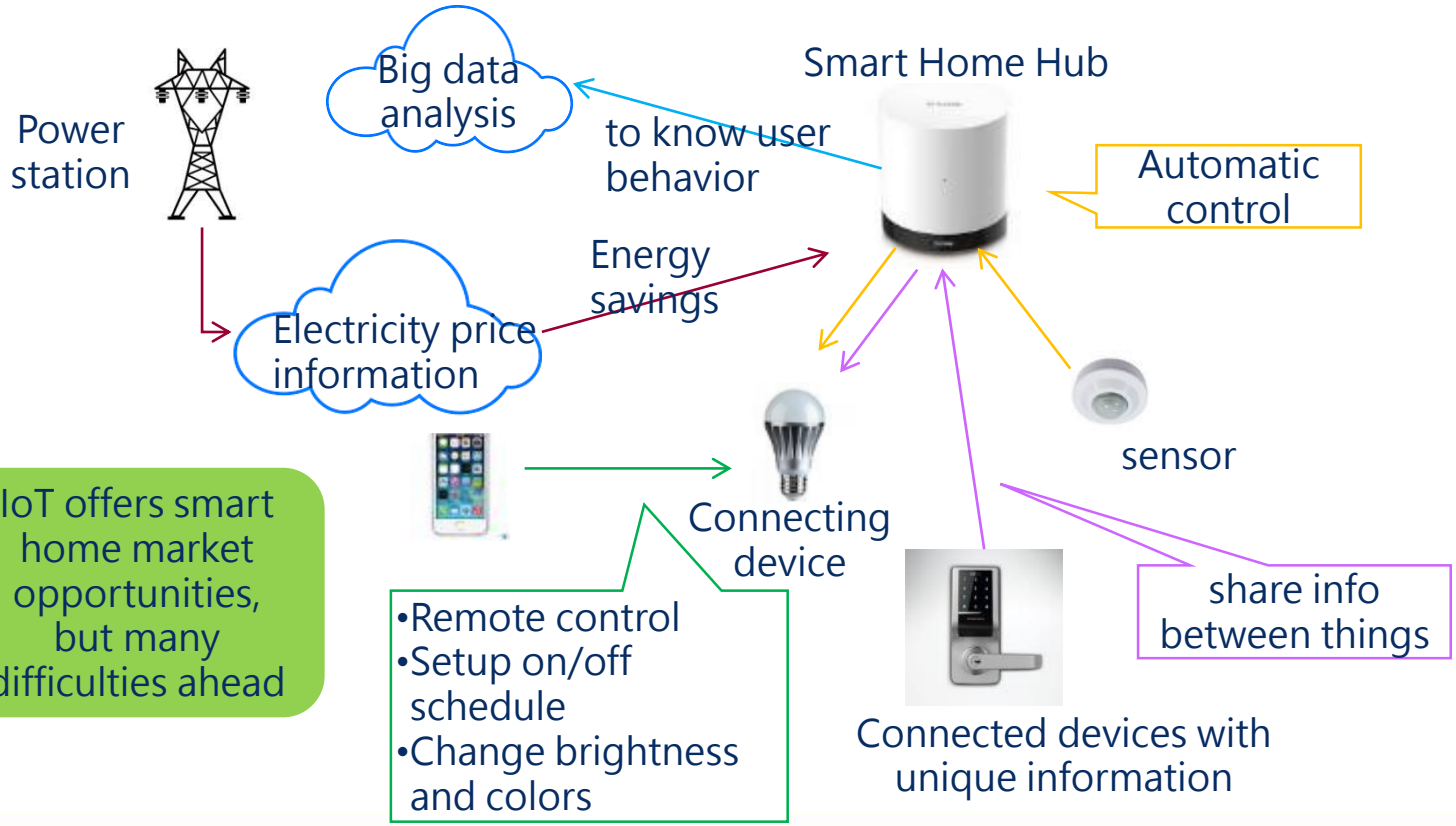
Data share

Combine device function into specific service

Make pay service possible

Third Step: Going smart by integrating clouds behind things

IoT can make home smart and create smart home market



Big data didn't help to reach a synergy, it leads smart home encounter difficulties

- Unclear benefits
- Security issues

Big Data

Cloud Network

- Expensive equipment
- Wrong equipment
- Installation problems
- Costs of abandoning existing equipment

High cost deter full purchase :

- Partial service
- Insignificant synergy

Cost

- Buy things
- Replace existing equipment
- Certain monthly fees

Benefit

- Safety
- Convenience
- Comfort

AI@HOME:
3 STEPS OF REDEFINING ‘SMART’

Can you make your own all decisions?

IoT@home

Improve efficiency

AI@home

Users don’t have to be aware of their needs

資料來源：insurancequotes.com

First Step: AI as Human Machine Interface

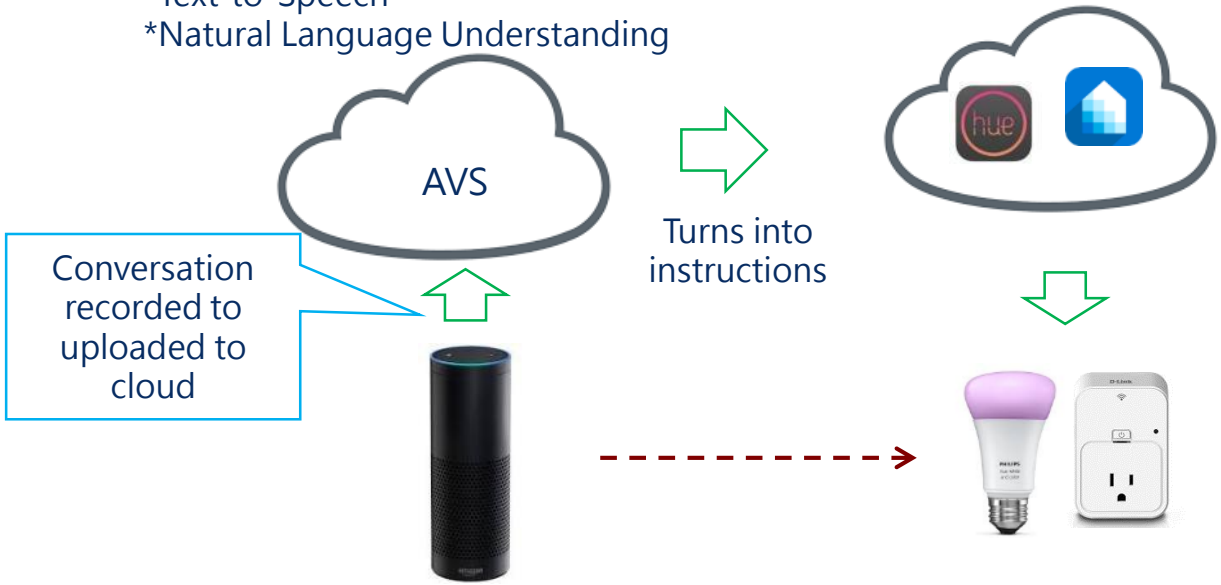
Singlecue Gen2

Machine vision-assisted control

- Developed for Smart TV originally.
- offers more privacy
  - no t on the cloud
  - no recording
- over 100,000 compatible home equipment。

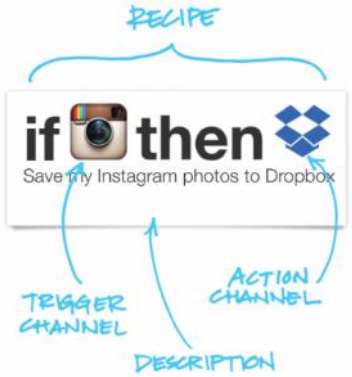
Amazon Echo uses voice AI to control things

Alexa Voice Service：
*Automatic Speech Recognition
*Text-to-Speech
*Natural Language Understanding



Second Step: AI as Automatic Control

IoT@home uses if/then for auto control



AI vision inside device enhances product functions

- Camera
- Weight sensors
- Internal cavity temperature sensor
- Core temperature probe
- Ambient light sensor

- Tegra K1+Cuda for AI

June Oven($1,495)

- Judge food varieties and portions
- Optimal cooking time and temperature
- Can identify 25 ingredients

Nest Cam IQ import various machine vision applications

- High-end cameras(4K+night vision+12x zoom)
- Google AI facial recognition
- Auto zoom in specific objects
- Tracking moving objects
- Nest Aware alerts to unusual happenings and sounds
- Detect abnormal sound and record it
- Google Assistant

鏡頭自動追蹤且zoom in

Automatically tag unusual captures and natural language search

Lighthouse Camera

- Vision AI
  - ToF 3D+Camera
  - adult, child and pet recognition.
  - Facial recognition
- Voice AI
  - Natural language video search

- "What did the kids do while I was out yesterday?“
- "Has the cat done anything interesting since I left?“
- "Who did you see at the front door on Tuesday between 8 and 10am?“

Third Step: AI-enabled business models

Are Smart Home services? Or products?

"Connected" means endless cloud fees, costs from firmware and app update. More than that, devices are just endurable

- Device makers get 1-time revenue and endless service
- Among smart home products, only webcam could create subscription service if there is rigid demand

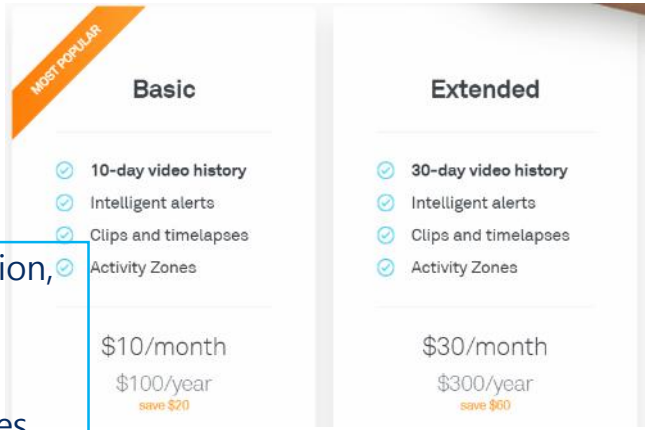
AI creates ‘must-have’ demand: No pay, no AI!

Nest Cam IQ

Nest Hello

+

Nest Aware
AI Service



- Still operable without subscription, but smart functions disabled
- Once subscribed, more device purchases follow
- Vendors willing to offer subsidies for devices if biz model feasible

Amazon Echo changes Smart Home market

Hardware subsidy to lower price

amazon echo

3 voice functions

Assistant	Weather, news, shopping list	•Stimulates purchases •Boosts e-commerce
Control devices	Light switches, door, hi-fi …	•Certification fee •Stimulates purchases
Combine offline service	Online ordering: pizza, Uber…	Service fee sharing

Lower device price to enlarge user base

Gain profits from Amazon.com at the end

AI voice assistant trends to combine display and vision application

Google Home/Mini

Google Smart Display

Echo/Dot/
Amazon Tap

Echo 2

Echo Show

Echo Look

Echo Spot

voice assistant + display to higher business values

Play video

Video phone

News message

song lyrics

Webcam display

Cooking recipe

more functions

More usage time

Higher using frequency

More using places

Understand consumers

amazon

- More online shopping
- More expensive shopping online

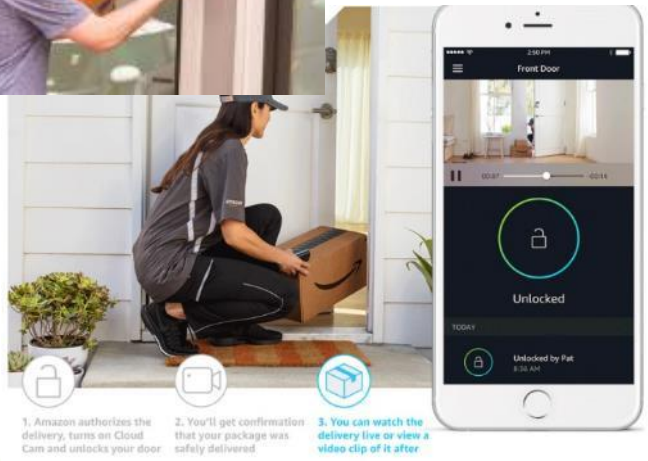
Google AdWords

- Precise ads target
- More ads time(in display)

Vision AI doorbell + Doorlock=Smart access control system

Amazon bought Blink and Ring

Walmart and Google provide in house delivery



In house delivery encourages fresh stuff shopping and expensive product shopping

Smart access control system expands e-commerce scope

August Access

- shopping
- Cleaning/ house work
- house repairing, installation
- Homestay
- Child care
- Real estate agency

Will iRobot still be Robot Vacuum dealer?

Roomba maker may share maps of users' homes with Google, Amazon or Apple

iRobot's chief executive says company could share or sell maps of robot v
users' homes to US tech firms as part of smart home and profit push

Robot vacuum cleaner plans to share maps of people's homes

share

CONCLUSION

IoT@home vs AI@home

IoT@home	AI@home
• Digitalization and Connection • Devices share info • Clouds Integration	• HMI enhancement • Auto decision making • Biz model creation

AI@home shall raise concern about privacy

Human Identification	environment ID	Stuff ID	Event ID
•Appearance •Relationship •Daily routine •Preferences and habits •Physical condition •Mental condition	•Location •Temperature, humidity •Air condition •Brightness •Energy consumption	•Layout •Furniture and appliances •Decoration style	•In/out time •Visitors •Sounds •Events

Privacy protection will be a key issue for smart home

Smart Home AI trends: Vision AI、Edge Computing and Privacy Protection are very important

AI Hardware

Voice AI

Vision

Voice and Vision AI integration

AI calculation

Cloud computing

Edge computing

Privacy protection AI solution

Thank You

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