Discussion: “A Survey on Internet of Things”

Authors:
Jie Lin, Wei Yu, Nan Zhang, Xinyu Yang, Hanlin Zhang, and Wei Zhao

Presented by:
Graham Schock

Agenda

- CPS and IOT
- Architectures of IOT
- Technology and Challenges of IOT
- Security and Privacy

CPS and IOT

Goal:

- Explain Cyber Physical Systems (CPS)

- Relation to IOT

Cyber

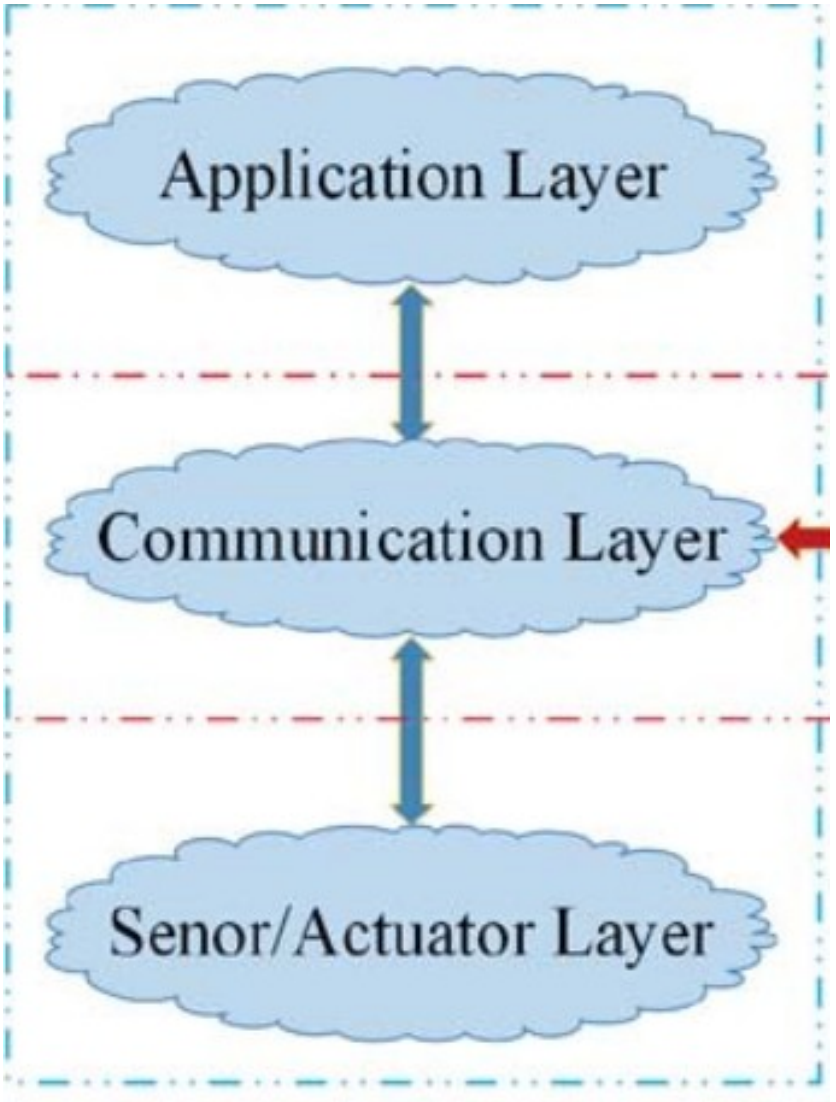
Physical

System

Overview of CPS

Modern sensing is integrated with physical components to ensure desirable operations in the physical world.

Overview of CPS



CPS and IOT

So what’s the difference?

CPS and IOT

Main Objectives:

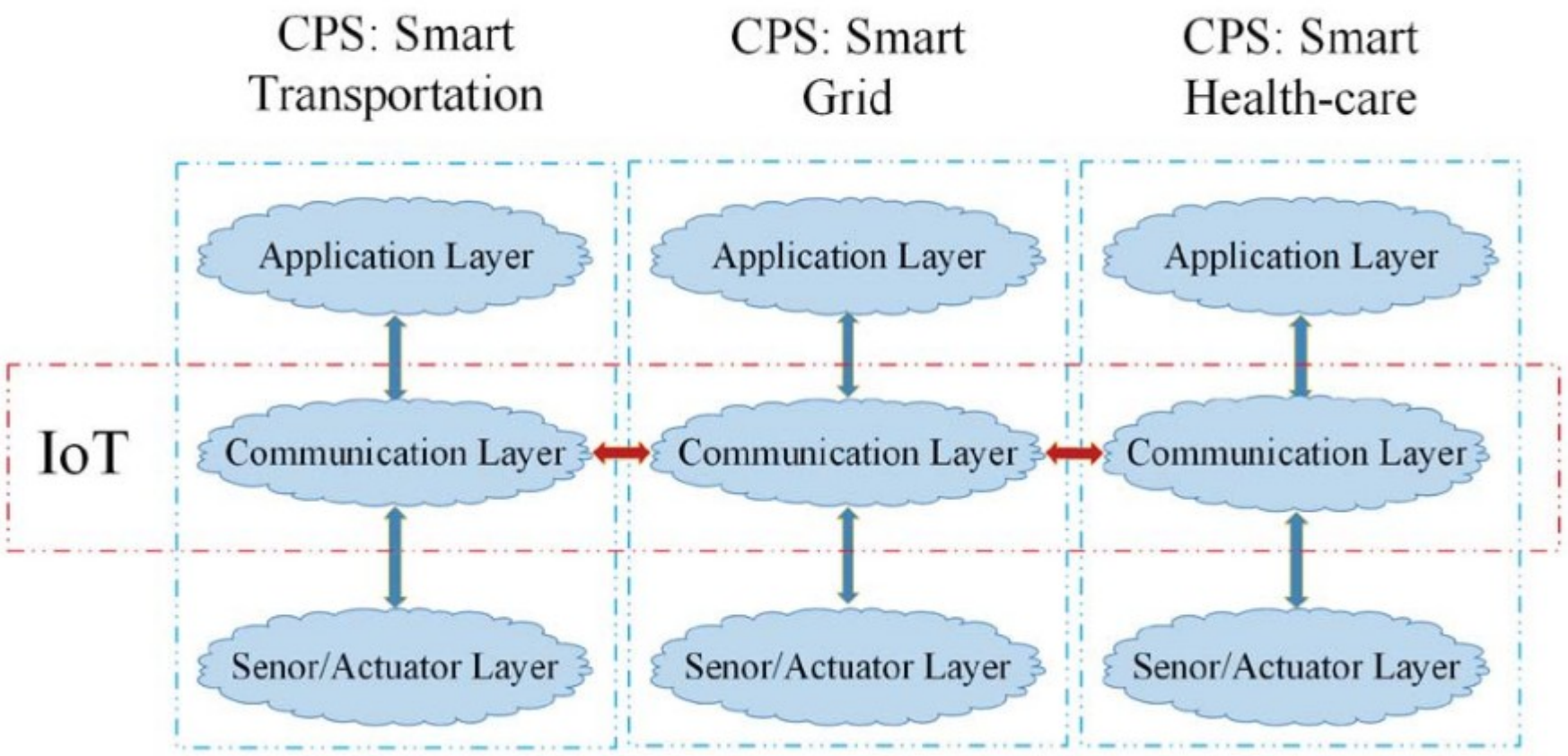
CPS: Measure state information and ensure efficient operation on physical devices

IOT: interconnect networks to share data, resources, and analysis.

CPS and IOT

“CPS is considered as a system, while IOT is considered as an internet”

CPS and IOT (Smart Cities)



Architecture

2 main types

-Three Layer Architecture

-SoA based Architecture

Three-Layer Architecture

-Perception Layer (the bottom)

-Network Layer (the middle)

-Application Layer (the top)

SoA-Based Architecture

- Component based, can be designed to connect different units of an application via interfaces and protocols

- Focus on workflow of coordinated services and enabling the reuse of software/hardware

- 4 layers, 3 layers + service layer

The Service Layer

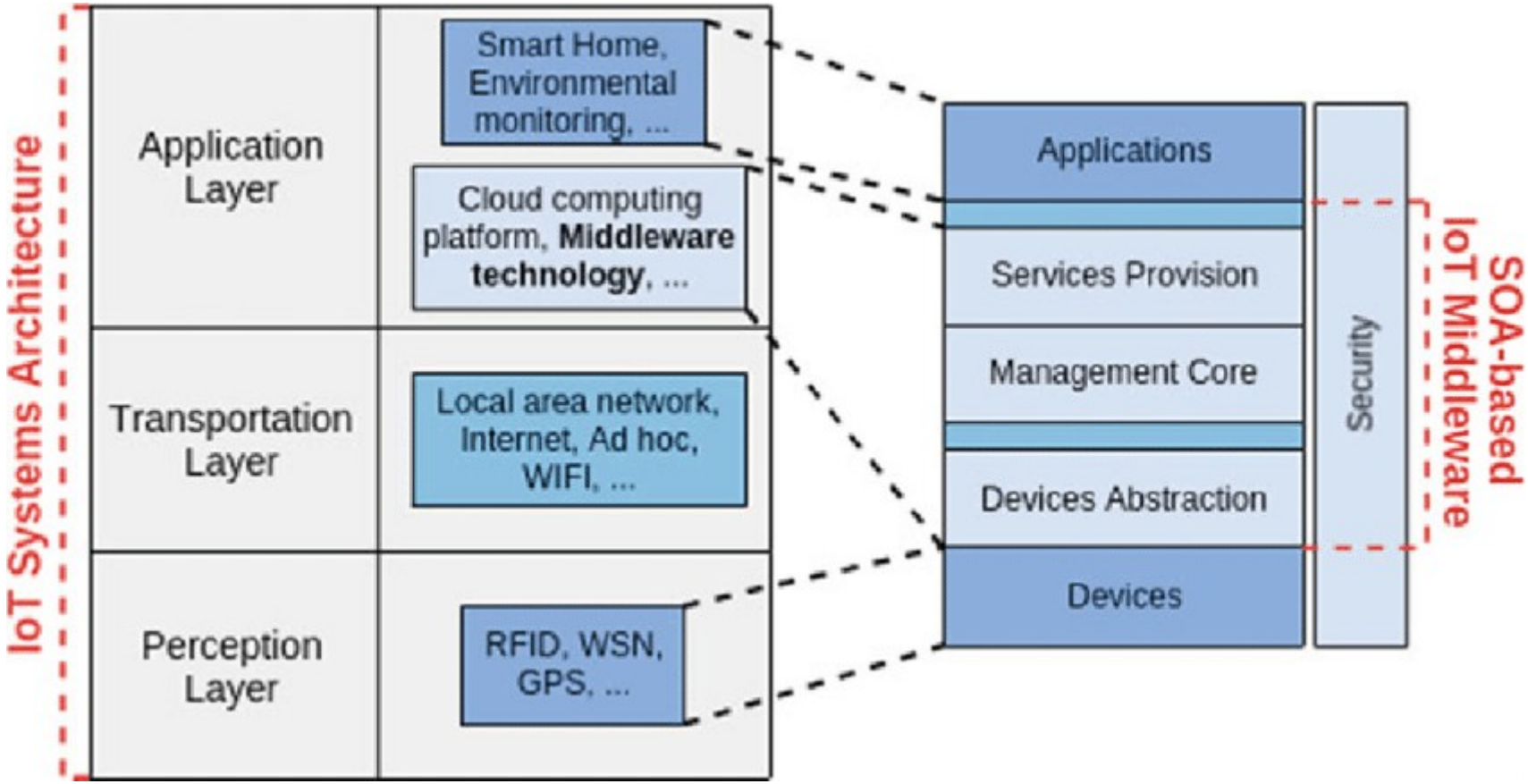
Provides services to application layer

Ex: Service Composition

Interact with connected objects and integrate service requests to in an efficient way

Determines trust mechanisms

SoA based architecture



Enabling Technologies

Through these architectures IoT can be realized with different technologies.

What is an enabling technology?

Perception Layer

Main Objective: to identify and track objects.

How do we achieve this?

Enabling Technologies (Perception Layer)

RFID 

Wireless Sensor Networks

Barcode

Architecture of RFID Tag

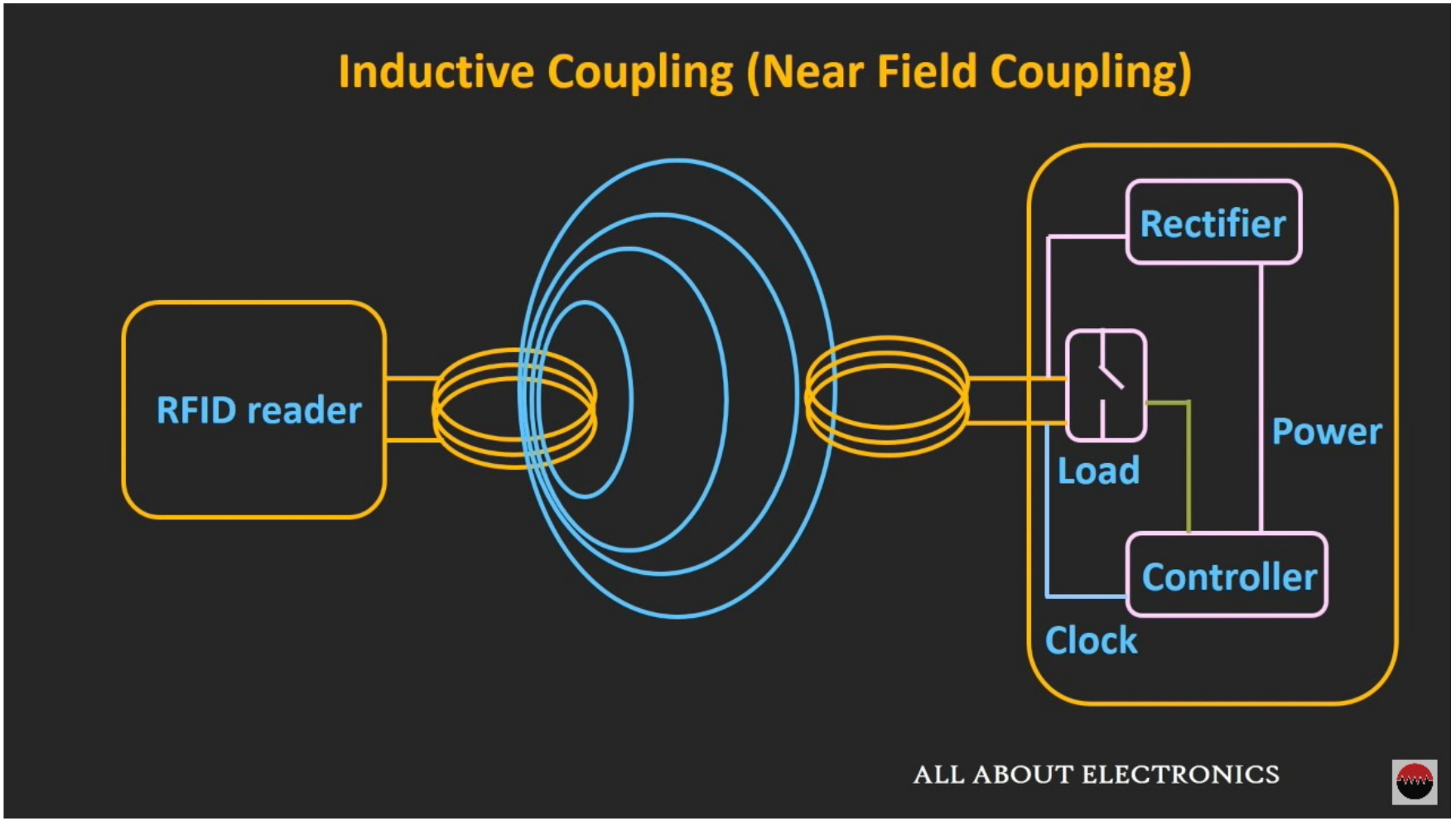
- Integrated Circuit, stores and processes information and modulates and demodulates RF signals

-Means of collecting power

-Antenna

Architecture of RFID Tag

Architecture of RFID System



RFID

Network Layer

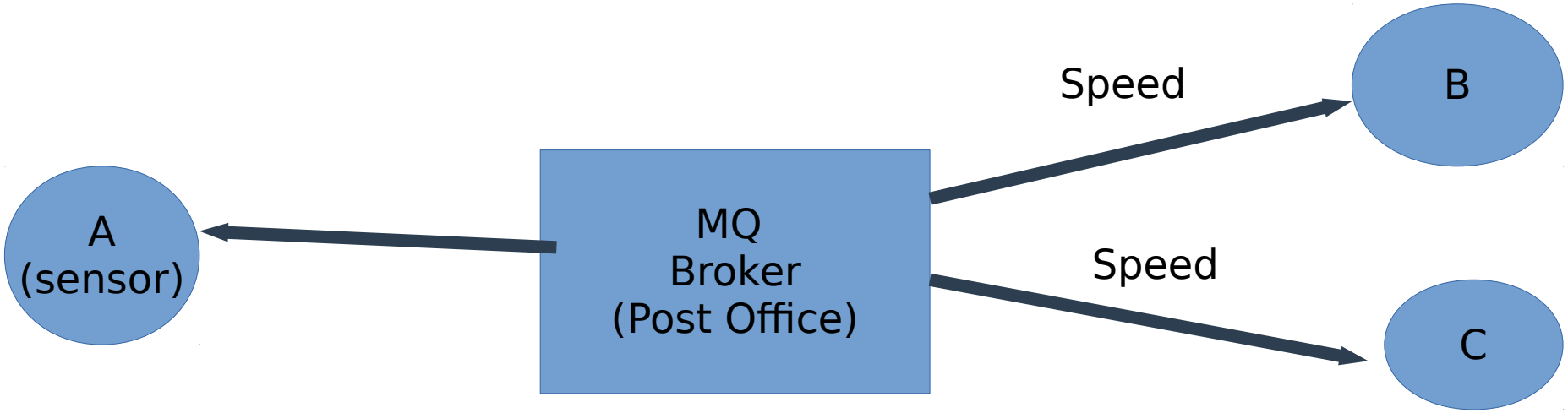
-IEEE 802.15.4

-6LoWPAN

-ZigBee

-MQTT 

MQTT



Service Layer

-Interface

-Service Management

-Middleware

-Resource Management and Sharing 

Why do we need sharing?

A lot of data is going different places. Some applications share part of the network resources.

Security And Privacy

Security Features of IoT

Security issues

Security Features

-Confidentiality

-Integrity

-Availability

-Identification and Authentication

Identification and Authentication

-Birth certificate

-White list

-Device fingerprinting

Device fingerprinting

Device information is gathered and made sure that it is behaving correctly

Machine Learning?

Device Fingerprinting

Table 3: Device Descriptions, Operations and Data Instances

Device Label: Device	Model	Category	Connectivity	Mode of Operations	Data Instances
1: TCP Light	GL30002-TP	Light	Wi-Fi	Connects through a Hub	1151
2: AWOX Light	SLCW13-14:D4:41	Hue light	Wi-Fi	Connects with a mobile app	2000
3: MUSAIC Music Speaker	MP10	Music Player	Wi-Fi, Ethernet	Connects with a mobile app	1003
4: D-Link Camera	DCS-932L	Camera	Wi-Fi, Ethernet	Connects through laptop	1991
5: iDevice Socket	IDEV0002	Socket	Wi-Fi, Bluetooth	Connects with a mobile app	415
6: iView Light	R60	Hue light	Wi-Fi	Connects with a mobile app	571
7: Lutron Hub	L-BDG2	Hub	Wi-Fi	Connects with a mobile app	108
8: Netatmo Climate	Home Coach	Climate Control	Wi-Fi	Connects with a mobile app	70
9: Omna Camera	DSH-C310	Camera	Wi-Fi	Connects with a mobile app	1072
10: Philips Hue Light	Hue 2.1	Light	Wi-Fi	Connects through hub	986
11: TPLink Light	Lb100	Hue Light	Wi-Fi	Connects with a mobile app	519
12: WEMO Outlet	Insight	Outlet	Wi-Fi	Connects with a mobile app	592
13: Wink Hub	2	Light	Wi-Fi	Connects with a mobile app	286
14: SmartThings Hub	-no model-	Hub	Wi-Fi	Connects with a mobile app	103