Smart Cities and IoT



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Contents

- Introduction of IoT and Smart Cities
- Discussion of A framework for IoT
- Instances and Practices
- Key Technologies and Issues

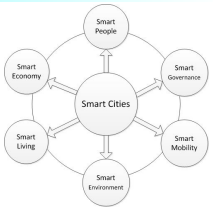
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Smart Cities

- Cities
  - Infrastructures
  - Companies and Factories
  - Community and Government
  - Communication

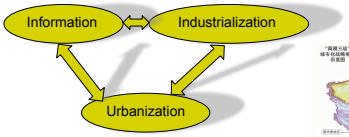


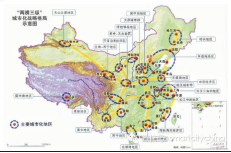


The Model of Smart Cities

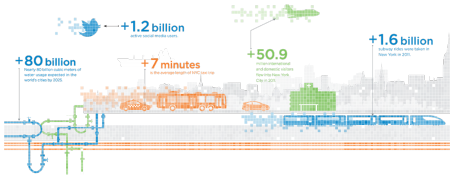
Smart cities in China

- China Industry Alliance of Smart City Technology Innovation (2012)
- There are 193 candidate cities in china
- Urbanization is going again. (52.57%/2012)



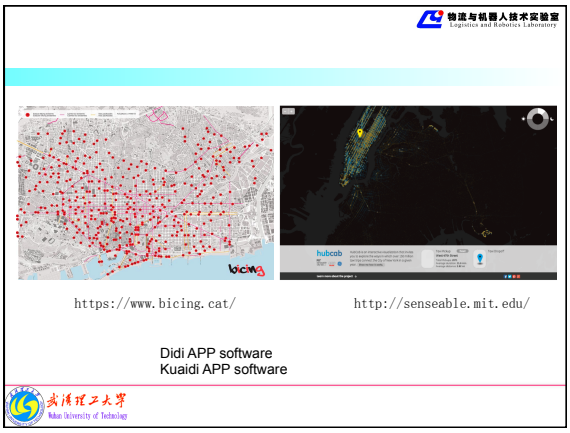


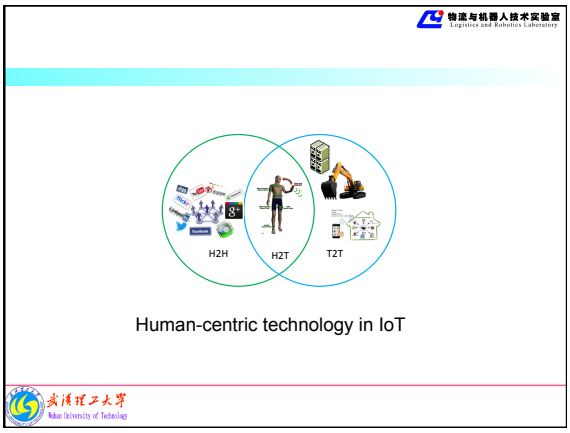
Smart for whom?



Human-centric application in Smart Cities(http://cusp.nyu.edu/educational-programs/)

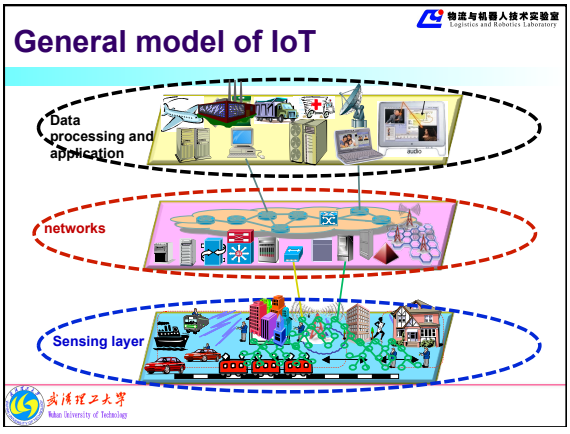


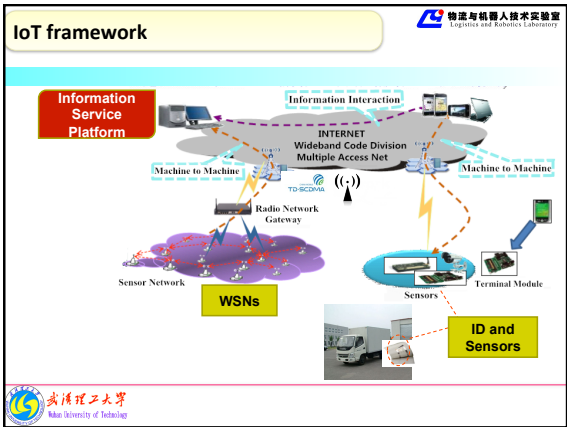

https://www.bicing.cat/
http://senseable.mit.edu/
Didi APP software
Kuaidi APP software


H2H
H2T
T2T
Human-centric technology in IoT

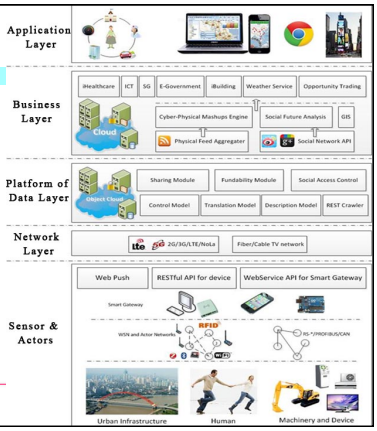

From Internet to IoT

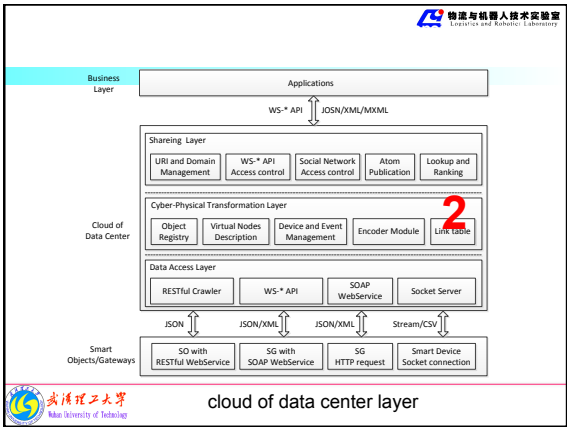

Contents
Introduction of IoT and Smart City
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General model of IoT
Data processing and application
networks
Sensing layer

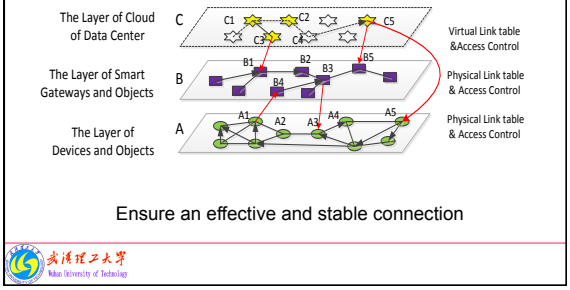

IoT framework
Information Service Platform
Information Interaction
INTERNET
Wideband Code Division Multiple Access Net
Machine to Machine
Machine to Machine
TD-SCDMA
Radio Network Gateway
Sensor Network
WSNs
Sensors
Terminal Module
ID and Sensors

Architecture of IoT in Smart Cities

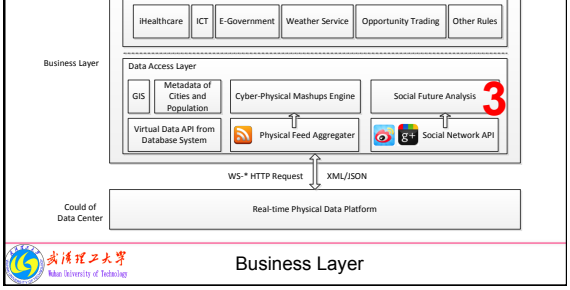




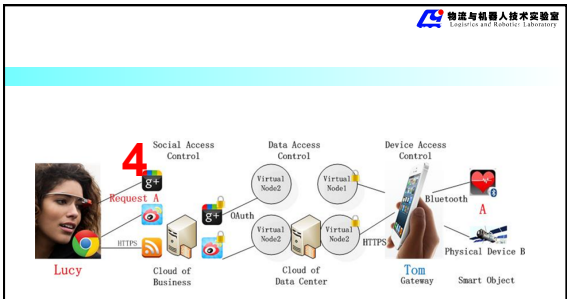
cloud of data center layer



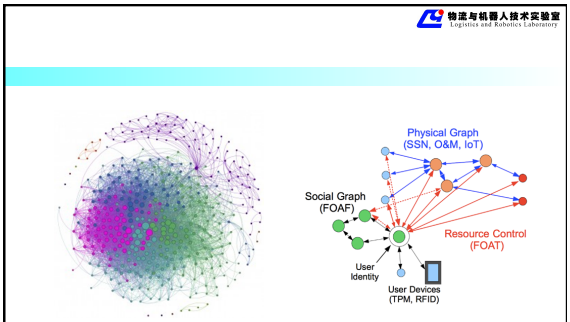
Ensure an effective and stable connection



Business Layer



An example of smart city service based on Google



Large scale connection and social internet of things



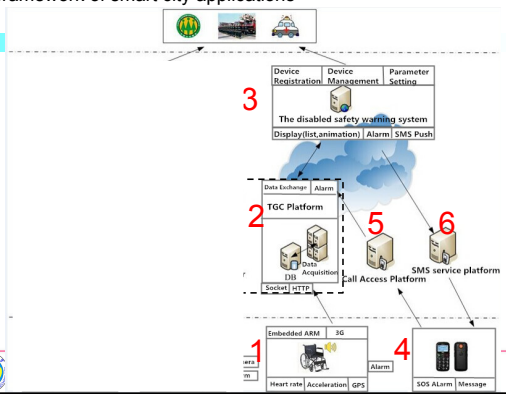
Big Data to Small Data:

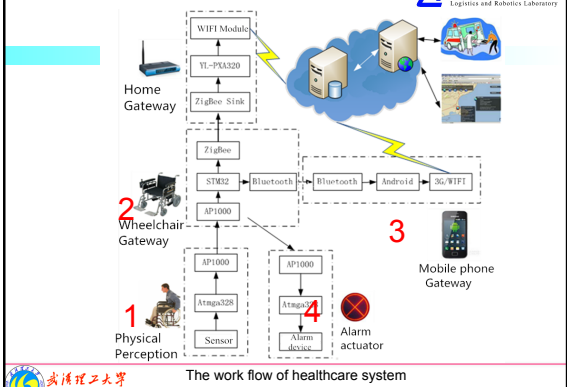
- trustworthiness management
- Service Recommended more accurately

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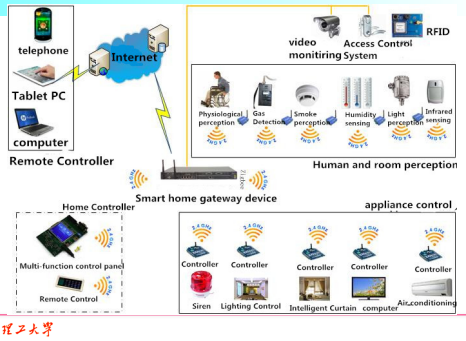
A framework of smart city applications



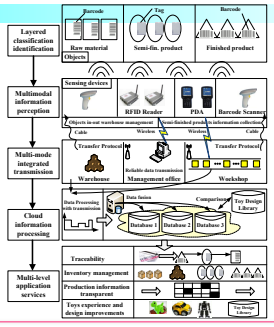


The work flow of healthcare system

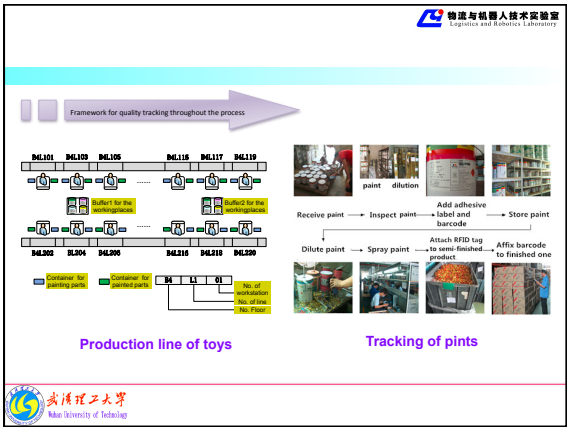
Smart laboratory

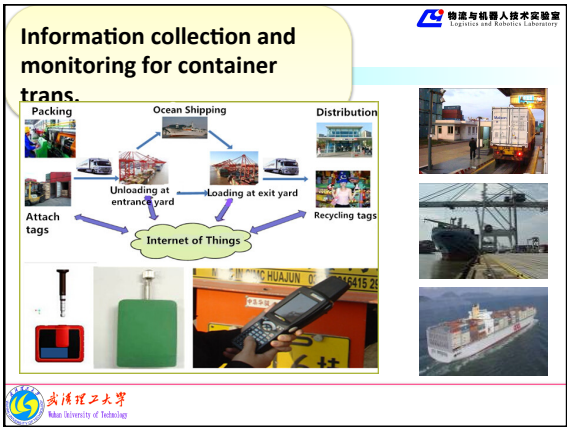


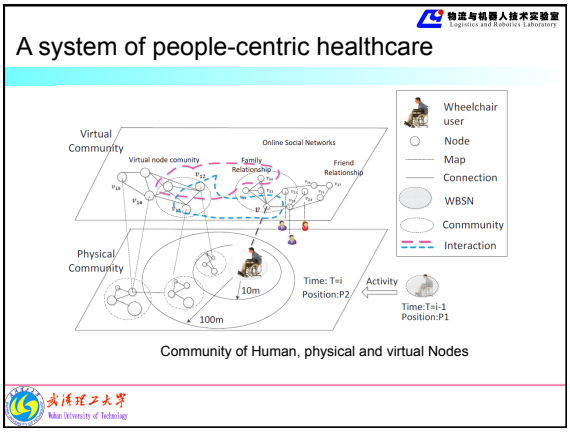
Management of manufactures

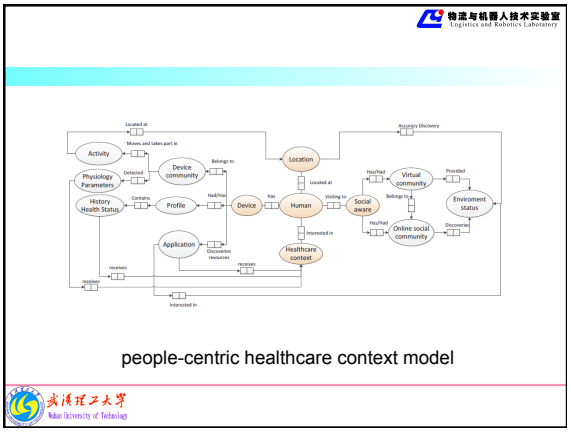


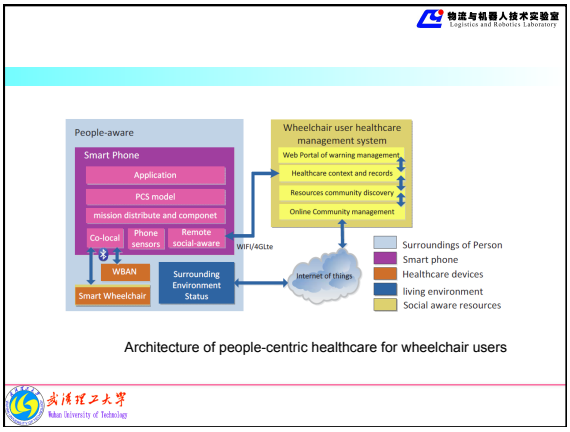
materials tracking system in toy production

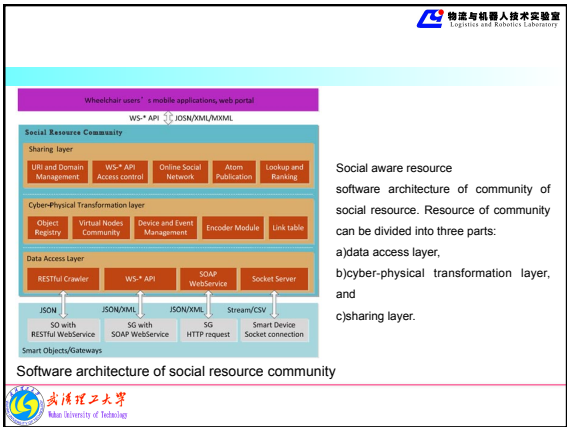










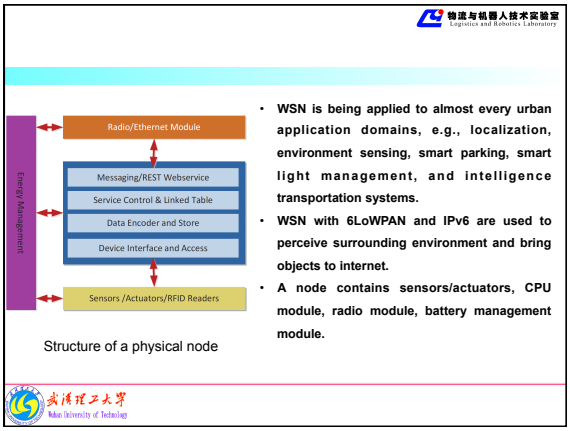


Social aware resource software architecture of community of social resource. Resource of community can be divided into three parts:

a)data access layer,

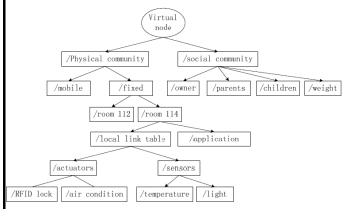
b)cyber-physical transformation layer, and

c)sharing layer.



Structure of a physical node

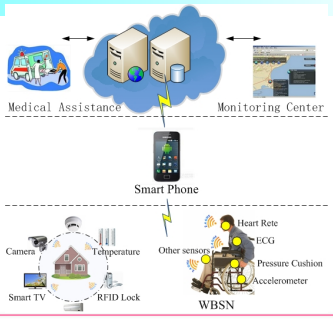
- **WSN is being applied to almost every urban application domains, e.g., localization, environment sensing, smart parking, smart light management, and intelligence transportation systems.**
- **WSN with 6LoWPAN and IPv6 are used to perceive surrounding environment and bring objects to internet.**
- **A node contains sensors/actuators, CPU module, radio module, battery management module.**

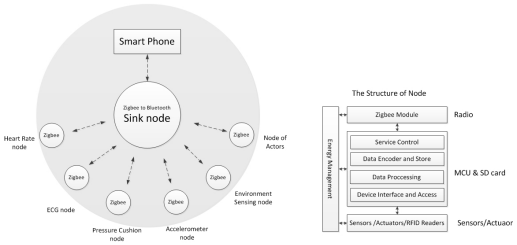


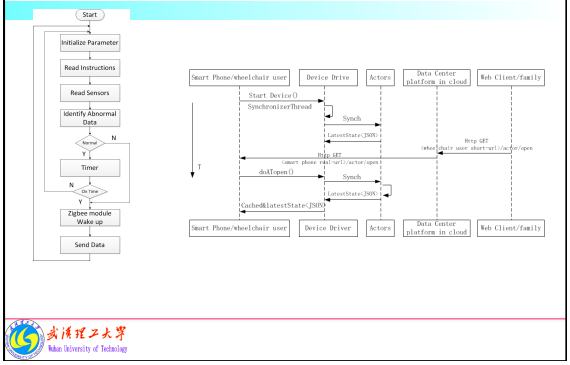
Its owner manages the register, sharing and lifetime of environment perceiving devices.

Its initialization needed to enter information about the relationship of community and sharing context.

A sample of device relationship in a virtual community, a virtual node indoor





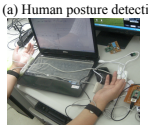




(a) Human posture detection



(b) Smoke Detecting Sensor

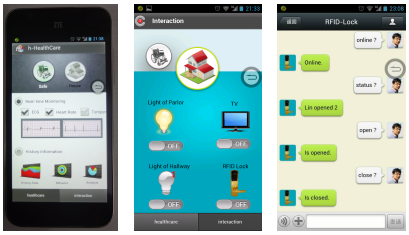


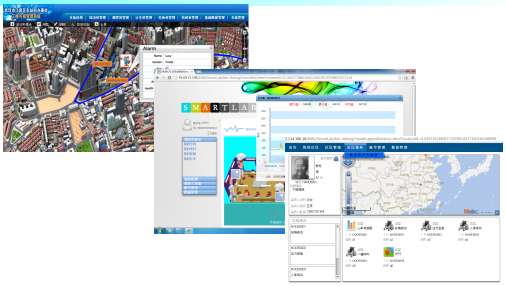
(c) ECG and Heart Rate sensor



(d) Intelligent wheelchair





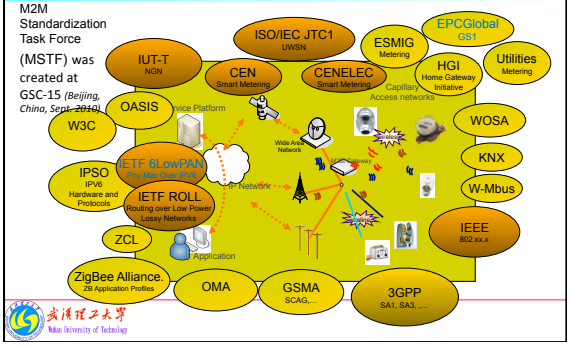


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Standardization

M2M Standardization Task Force (MSTF) was created at GSC-15 *(Beijing, China, Sept. 2010)*



- **Data Coding (EPC, IP?)**
  - **who (identification of subjects)**
  - **Where (location)**
  - **What (events)**
  - **When (time)**
  - **Conditions**
  - **…**

- Data centered to service centered?
- Meet dynamic requirements or even personalized needs?

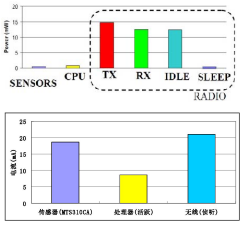
Agent-based
Middleware
Web2.0 Web3.0
Cloud computing

- Topology of IoT networks
  - Parts vs. Whole
  - Depth vs. width
  - Robust vs. Invulnerability
  - Opportunistic vs. Synchro



- Correlative, cooperation and mining
  - Data processing to cloud computing

- Energy harvesting and saving



Thanks and Questions?