Food supply chain traceability and sustainable development

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Outline

- Why traceability and sustainability?
- Finished and running projects
- Expected cooperated topics in future

Part one

Why traceability and sustainability

challenges put food industry under pressure

Rising concerns over food safety

Recalls, GMOs, Labeling, Bio-Terrorism

Changing supplier-retailer relationship

- Power-shift from manufacturer to retailer
- inventory control, order cycle-time reduction

Globalization

- Tailoring products to local taste and special brands
- Off-shoring of production

New technologies reshape the industry

- New technologies allow better tracking of product flows:
  - Scan-based trading (SBT)
  - RFID

Regulatory pressures and social responsibility

Environmental lobby groups
Complex regulatory environment

Changing demographics and lifestyles

Older consumer, higher incomes, diverse population, ethnic groups, changing lifestyles

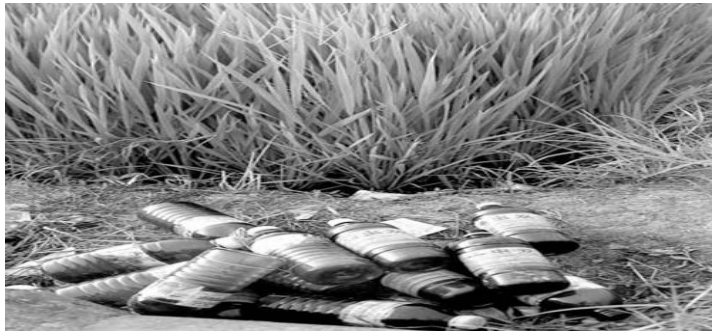
Resource and environment

Challenges: Consumers requirement

- meeting varying nutritional requirements for different consumers with **Changing demographics and lifestyles**
- increasing the available amount of high-quality protein food and food that is rich in minerals and vitamins, and some basic high-quality but low-priced food staples.
- A still higher standard is demanded of the food industry if it is to further consumer ability to pursue a nutritious diet while provide fundamental agricultural products

Challenges: Resources and Environments

- Resources utilizations and External Effect
  - low resource processing and conversion efficiency
  - high energy and material consumption
  - serious pollution and external effect
    - Incomplete statistic shows that in 2010, by-products from tilapia, codfish, salmon, cyprinid etc, is 2.6 Million tons.
    - discharge of sewage into the environment or low-valued utilization
- Agricultural production environmental degradation

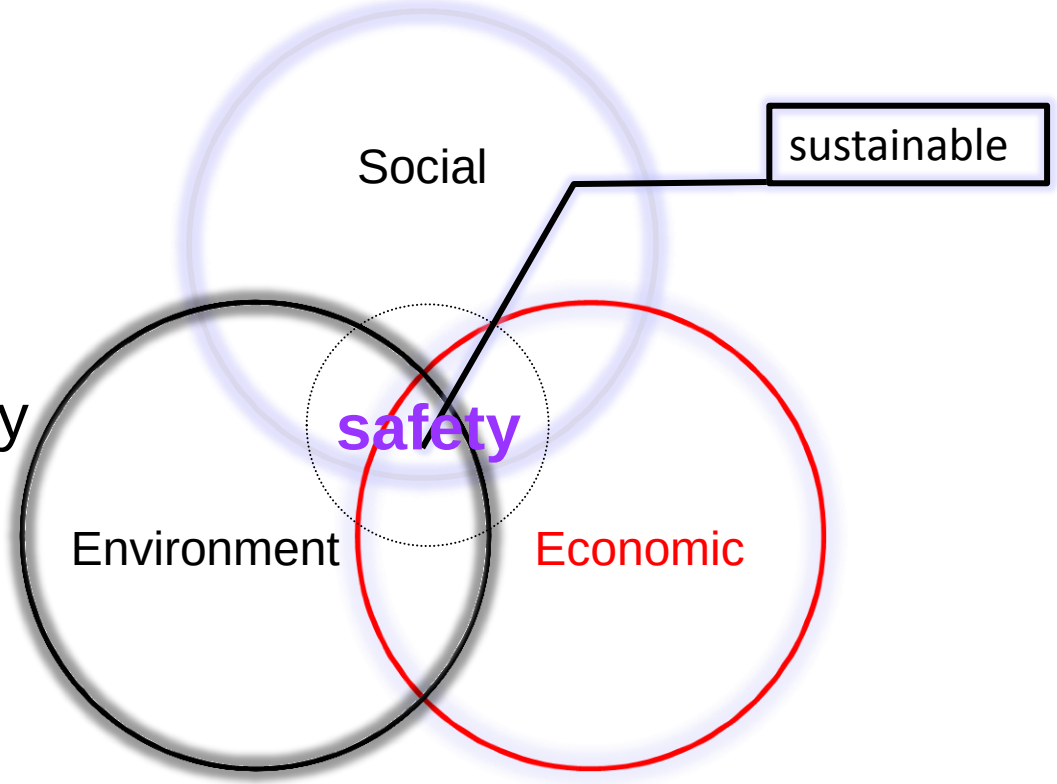


Global traceability required to cope with those challenges

- **ISO 22000:2005** - Traceability in the Feed and FoodChain- Nov 2005
- Global Food Safety Initiative **(GFSI) Guidance Document**
  - CIES The Food Business Forum
- **European Union Food Regulation Directive 178/2002**, effective Jan05
- **US Bioterrorism Act 2002**
- **Can-Trace** Canadian Food Traceability Data Standard (CFTDS)
- **SQF (Safe Quality Food)** 2000 Code.
  - SQFI is a Division of the Food Marketing Institute
- **GS1 Traceability Standard** – from GSMP's Traceability Industry requirements team (IRT)
- **Canadian Food Inspection Agency recall system**
- **USDA Food Safety and Inspection Service Directive** 8080 ver4 5/24/04

Food industry towarding sustainable development

- ENVIRONMENTAL
- ECONOMICAL
- SOCIAL
- Safety and traceability



Part two

Finished and running projects

Running projects- at national level

Project Name	Fund by	duration	Researchers involved
Agricultural input (Fertilizer) manufacturing process monitoring technologies	National S&T support plan	2012-2014	zhang Xiaoshuan
Quality safety Monitoring and traceability technologies in grape logistic	Ministry of Education	2012-2014	Zhang Xiaoshuan
Emergy analysis based sustainability evaluation in grape greenhouse, northern China	National Natural Science Foundation	2012-2014	Tian Dong
Grape& wine supply chain evaluation and industrial Economics	Ministry of agriculture	2011-2015	MU Weisong, FU Zetian,Tian Dong
Traceability integrated technologies and share platform for agriculture product	Ministry of Agriculture	2011-2013	Zhang Xiaoshuan
Agricultural products labeling management in China	Ministry of Education	2012-2014	Zhang Xiaoshuan
WSN-based Method for monitoring quality safety of Aquatic products during cold chain logistics	National Natural Science Foundation	2011-2013	FU Zetian

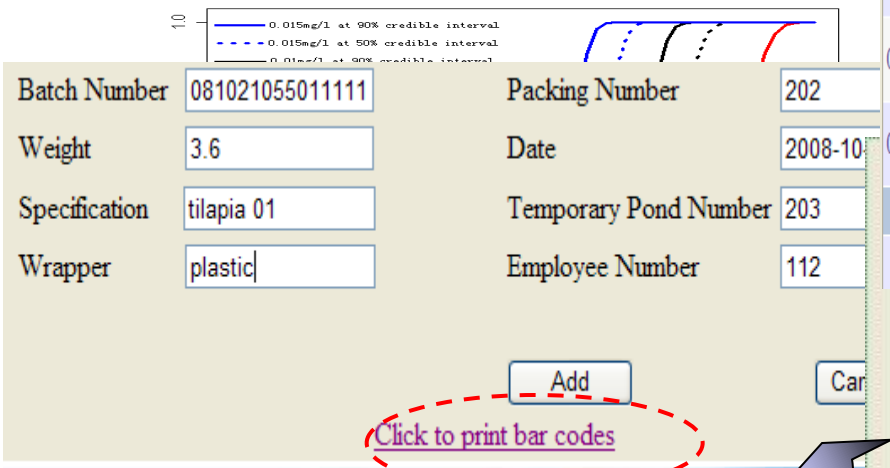
International projects…

Project Name	Fund by	duration
Quality Intelligent Sensing and Information Processing technology for fish product during cold chain management	Sino-Romanian	2013-2014
Sustainable production and consumption models and certification tools in Chinese food supply chains	EU SWITCH Asia	2013-2016
Energy Saving and Quality Control oriented Monitoring Technologies based on WSN for Aquatic Product Cold Chain	Sino-Vietnam	2014-2015
Environmental impact analysis and risk assessment , development of sustainable technologies for aquaculture	Sino-Hungary	2014-2015
RFID (Internet of Thing) based animal individual identification technology and its application on quality traceability system	Sino-SERBIAN	2014-1015

We have researching and focus on quality management and Engineering…

- Quality management modeling
- Traceability system development
- Cold chain monitoring
- Shelf life prediction and logistic process evaluation
- Sensors/TTI development and application

Quality managem



Introduction Fry Information Search: Batch Number Search

Batch Number	Date	Weigth	Sort	Health State	Manufacturer	Quarantine Unit Number	Quarantine Results	Technist Number	Editor	Delete
0810210550111111	2008-04-10	2.5 Kg	tilapia 01	well	SKY-Blue	26	health	16	Editor	Delete
0810210550111112	2008-04-11	2.3 Kg	tilapia 02	good	SKY-Blue	21	health	11	Editor	Delete
0810210550111113	2008-04-12	2.2 Kg	tilapia 03	well	SKY-Blue	22	health	12	Editor	Delete
0810210550111114	2008-04-13	2.2 Kg	tilapia 04	fine	SKY-Blue	23	health	13	Editor	Delete
0810210550111115	2008-04-14	2.6 Kg	tilapia 05	fine	SKY-Blue	24	health	14	Editor	Delete

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Specification 111 ProductionDate 10/21/2008

Weight 3.6 kg Manufacturer Hainan Sky-Blue Ocean Foods

printview

Traceability Code Of Tilapia Quality Safety

Tace Code: (01)6920952010114|10|0810210550111111

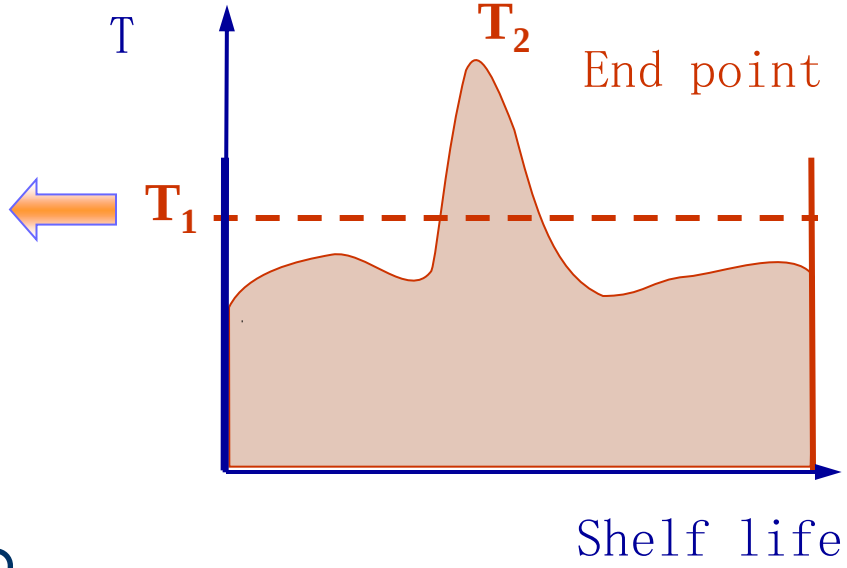
ProductName: Tilapia
ProductionDate: 10/21/2008
Manufacturer: Hainan Sky-Blue Ocean Foods
Address: Guilingyang Development Zone, Haikou City, Hainan Province,China

preview

print

Cold chain monitoring

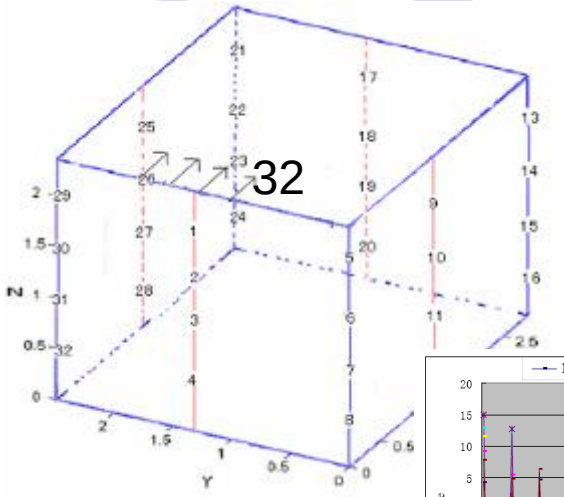
Temperature profile acquisition

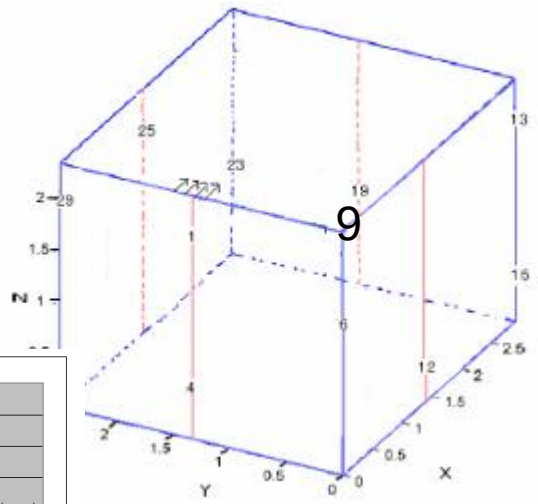


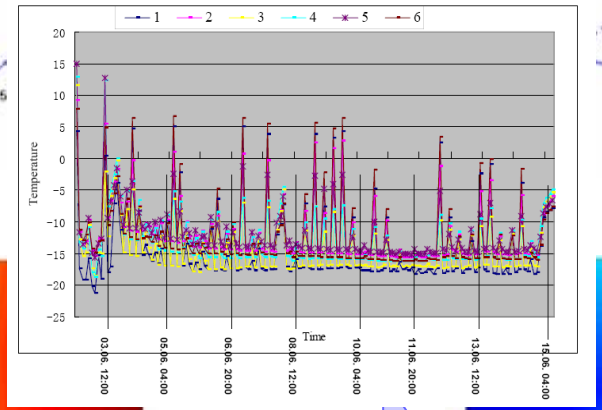
Consumers’ perception

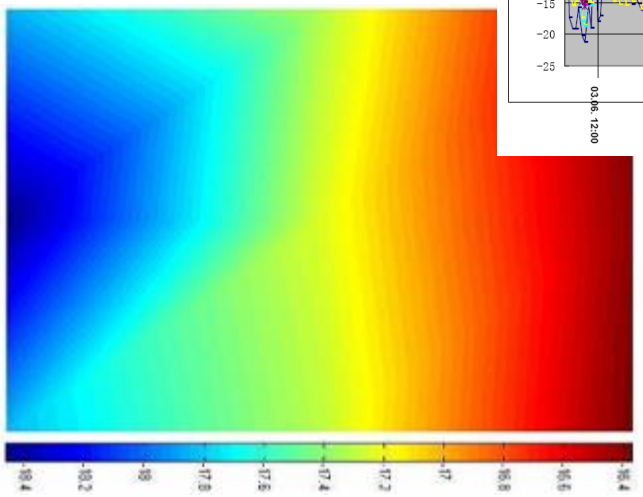
Real shelf life

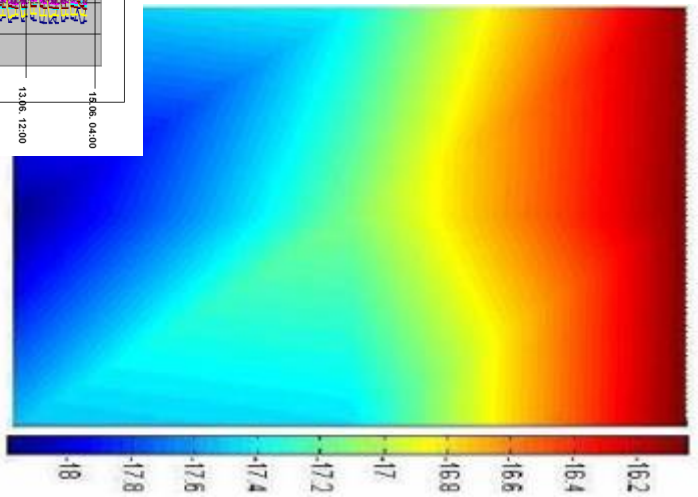
Temperature monitoring (Sensors deployments)





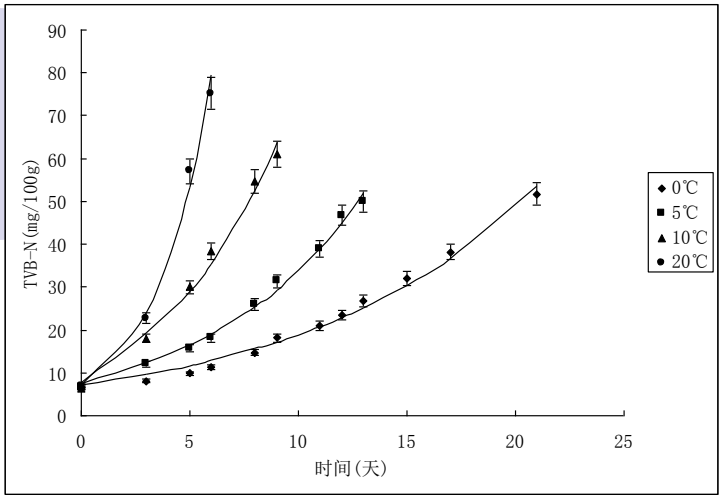




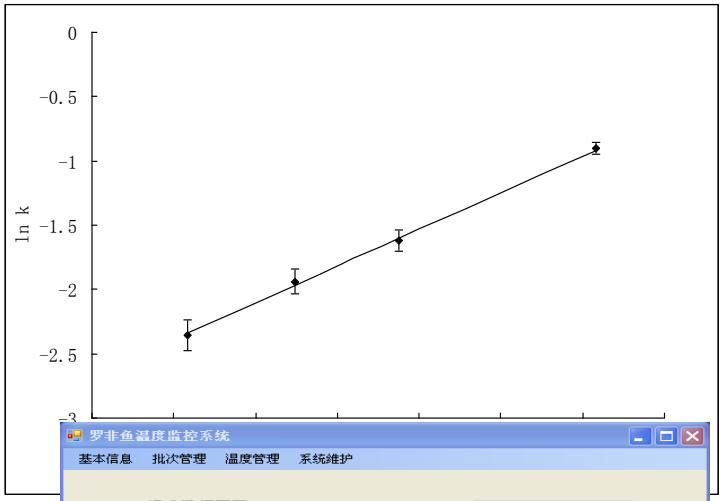


Shelf life prediction and its software development

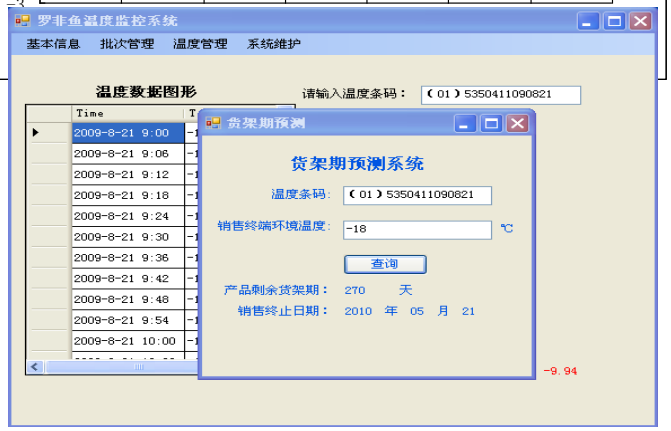
$$C_{(t)} = C_0 \, e^{kt}$$



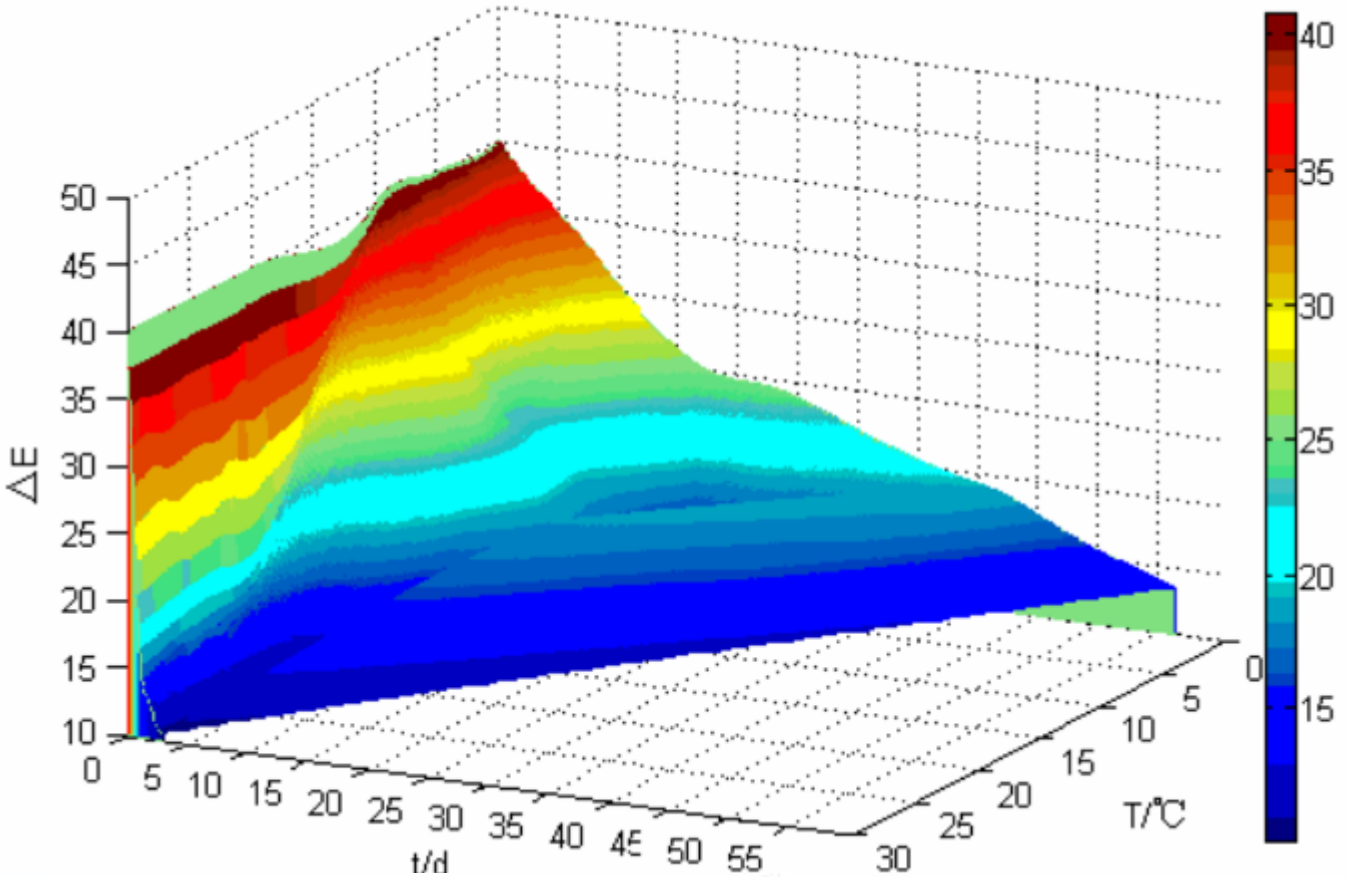
$$\ln k = \ln k_{ref} - \left(\frac{E_a}{R}\right)\left[\frac{1}{T} - \frac{1}{T_{ref}}\right]$$



$$C_{(t)} = C_0 \exp\left\{-k_{ref}\int_0^t \exp\left[-\frac{E_a}{R}\left(\frac{1}{T_{(t)}} - \frac{1}{T_{ref}}\right)\right]dt\right\}$$



TTI(Time-temperature indicator) application



的温度响应曲线

-20℃，◆-25 ℃，◂-30℃）

0h

2h

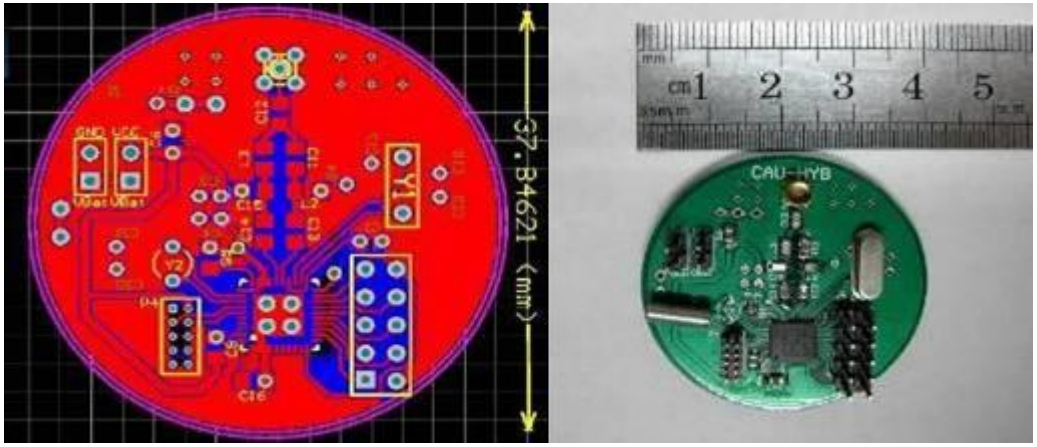
4h

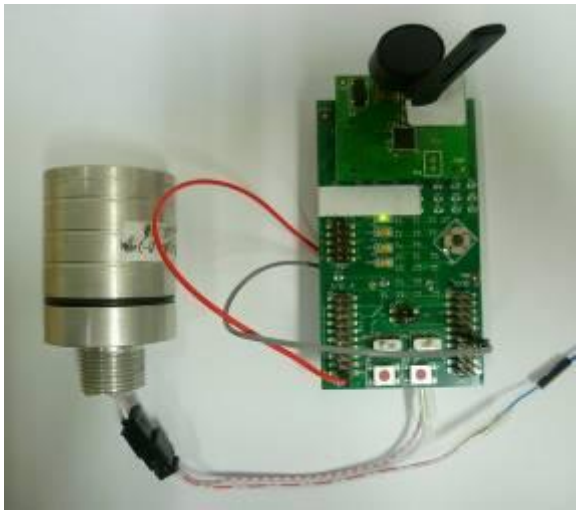
10h

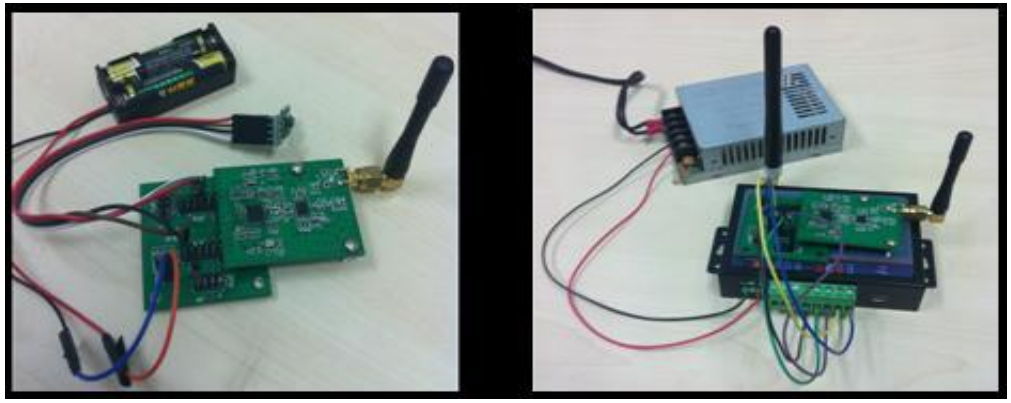
8h

6h

Sensors development and application







In addition, we also research some economic analysis evaluation for food supply chain traceability and sustainability

- Operating mechanisms of traceability system
- Cost/benefit of traceability system
- Consumer perception of traceable products
- Labeling management
- Technology performance evaluation for logistic
- Supply chain Sustainability evaluation

Part III Expected cooperated topics in future

- EU horizon 2020(FP8)
- EU-China
- EU Switch Asia
- Bilateral-government cooperation framework

From research objective

- Fishery supply chain
  - Sustainable development in aquaculture (marine/ industrial)
  - Quality Monitoring & Traceability
  - Cold Chain Management
  - …
- Grape and wine supply chain
  - Economic and management
  - Quality Monitoring & Traceability
  - …
- Other food supply chain and sustainability evaluation

From Information technology

- Sensors development for quality safety and traceability during transportation…
  - Live aquatic products transportation/logistic monitoring
  - Modified atmosphere transportation transportation/logistic monitoring
  - Microbial sensor/TTI
- Sensors based quality safety monitoring, shelf life predication….
- sustainability evaluation

Thank you for your attention!

For more information, please contact:

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