

Security Management in the Internet Era

12th: Midterm Presentation (1)
December 15, 2011

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Schedule

01st (09/22) Course Description

02nd (09/29) Cloud Security (1)

03rd (10/06) Cloud Security (2)

04th (10/13) Military use of the cyber security technology and its issues

05th (10/20) IPv6 Security

06th (10/27) Guest Lecture (Joichi Ito)

07th (10/27) Personal Information and Security (1)

08th (11/10) Personal Information and Security (2)

09th (11/17) Evaluation of Security Risk

10th (12/01) Guest Lecture

11th (12/08) Guest Lecture

12th (12/15) Midterm Presentation (1)

13th (12/22) Midterm Presentation (2)

14th (1/12) Final Presentation (1)

15th (1/19) Final Presentation (2)

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Final Assignment

Please identify the issues to be resolved in our society and how CPS(Cyber- Physical Systems) can be utilized to solve the problems.

Furthermore, by utilizing this system, make clear case for new problems.

Answer should consider the following points.

- Technology
- System
- Education
- Promotion of taking risk while proceeding it

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Supplementary Note

- Slides in English and Presentation in English
- 20-minute presentation each team
- 15-minutis question and answer

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Presentation schedule

- 15 Dec. Midterm Presentation
 - Group 1 and 2
- 22 Dec. Midterm Presentation
 - Group 3 and 4
- 12 Jan. Final Presentation
 - Group 1 and 2
- 19 Jan. Final Presentation
 - Group 3 and 4

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Group 1

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Human tracking system with personal mobile tools

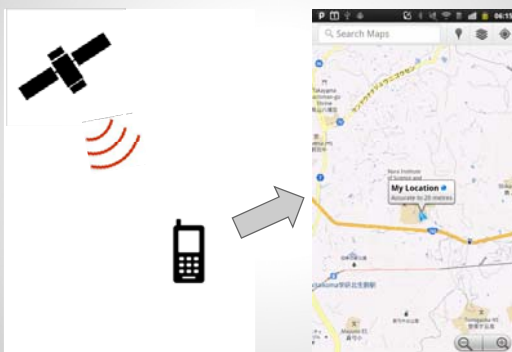
Midterm Presentation
Group 1

- Noriyuki Suzuki, Fall Doudou (NAIST), Toshiaki Hatano, Shinya Hiruta (SFC),
- Dan Sawada (MIT)

Human tracking

- We can get location information with some tools.
- Grobal Positioning System(GPS)
 - Mobilephone, Car navigation
- Log information stored in IC card
- We can use these tools for "Human tracking".

GPS tracking



Log in IC card

- e.g. Train use log



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2011/11/12, From: **Tokyo** 14:40, To: **Akabane** 15:00

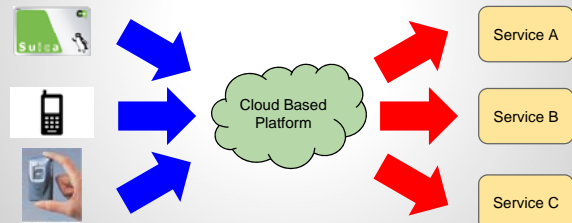
⇒ Collecting these information, we can create new services.

Our Proposal

- Establish a cloud computing environment
 - for collecting and providing
 - human tracking data

Key Aspects

- Cross-platform Data Collection
- Access to Data by Wide Variety of Service Providers



TECHNOLOGY POTENTIALLY USABLE FOR WIDE AREA HUMAN TRACKING

- We suppose that "System Vendor or Operator" fully support this project.
- Users have no control, off limits.
 - In fact, only user can choose is Sing up or not.
 - We assume we can use data without anonymity, because of our greater purpose.

Mobile Phone Tracking

- Stake holder: Mobile Phone Operator(carrier),
- (maybe) Vendor too.
- 1. Location Registration
 - Mobile Phone Operator(Carrier) know customers' current location to handle call request.
 - e.g. モバイル空間統計
- 1. handset-based tracking
 - Way to track customers' location, by installing software on their phones.
 - e.g. Carrier IQ

e-Money(NFC), Point card, Credit Card

- Stake holder: Mobile payment operator,
- Transit agency
- These device/card have its own IDs on it.
 - ID is tied to user.
 - User could be tracked by payment log, especially by Transit agency.

Radio ID Tracking

- Stake Holder: None (maybe 高木浩光?)
- Some radio system client periodically sends broadcast beacon with its ID.
 - Bluetooth Device
 - Wi-Fi (AP), like a mobile Wi-Fi Router?

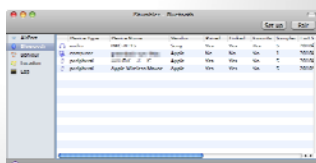


fig: example of Bluetooth Device scan

Facial reorganization

- Stake holder: Police Organization, Landowners and leaseholders
- e.g. Emigration and Immigration Management in Airport
- e.g. Road Camera (a.k.a CCTV Camera) on London City



fig: CCTV Camera in London City



fig: Smart Gate, automated passport control in Austria.

Lifelog

- Stake holder: Service Operator
- e.g. Foursquare, Twitter, etc...



fig: foursquare

Services

Services

- for Safety
 - For Human / Object safety
- for Business
 - Commercial use for Company / Person
- for Everyday life
 - Application to support person's everyday life

Safety

- Human safety
 - Protecting children from crime
 - Support elderly people life
- Object safety
 - Protect vehicle against theft
 - e.g. Car tracking by mobile device



Mimamori-pot [*1]



Koko-SECOM [*2]

[*1] <http://www.mimamori.net/service/index.html>
[*2] http://www.secom.co.jp/corporate/release/2010/nr_20100806.html

Business

- For Company
 - Marketing for shops
 - e.g. Where customers come from
 - e.g. User trajectory inside shops
- For User
 - Location aware advertisement
 - e.g. Get coupons for a nearby shop
 - Recommendation of shop/place
 - e.g. Recommend nearby tourist attractions

Everyday life

- Life log
 - Visited place is automatically logged
 - User can review logs later
- Location sharing application
 - Sharing present location with friends

- **Drawbacks**
- **Privacy Issues**

Information Collection

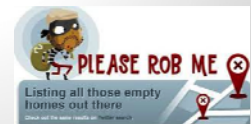
- Should users be aware of the tracking
- Should users be able to turn it off
- Should users be allowed to control the storage of information
- Should the information be personally identifiable or protect the anonymity of the users

Information Retention

- Where the information is stored
 - Cloud admins have full power to the users' data
 - Cloud is multi-tenant some malicious users can illegally get access to the other users' data
- Quantity and persistence of information

Information Use

- National security usage
 - The government can get access
 - to the users' information
- Advertisements
- Information disclosure
 - robber...



Conclusion

- We suggest Human Tracking System using mobile tools that have information location.
- Correcting our location on cloud, we can get new services for our safety, business, everyday life.
- We have to take care about privacy.

Group 2

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CPS for Artificial Environment

Group 2: Ega Dioni PUTRI, Hirotaka NAKAJIMA,
Yoshimasa OBANA, MIGUEL Patiño González

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@ Contents

- 1 Introduction
- 2 Issue Description
- 3 Solution
- 4 Closing

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@ Introduction

- **What is “Artificial Environment”?**
 - [Artificial] made by human skill, opposed to natural
 - [Environment] (ecology) the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time

(Dictionary.com)

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@ Introduction (cont'd)

Artificial Environment

easily influenced by nature

survive by human control mechanism

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@ Introduction (cont'd)

- **What is “Artificial Environment”?**
 - [Artificial] made by human skill, opposed to natural
 - [Environment] (ecology) the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time

↓

Necessary to well supervise

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@ Introduction (cont'd)

Tea Farm near Mt. Fuji

Shrimp Pond, Jepara, Indonesia

Bos Indicus Cattle, Paraguay

Our focus: Agriculture & Aquaculture

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@ Issue Description

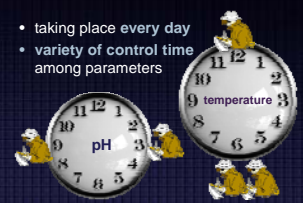
Why Agriculture and Aquaculture?

- Population is increasing, demand as well
- Need of stable and efficient food supply
- Less sharing about "know-how"
- Closely related to use of physical system
- Exact computation produces optimum crop

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@ Issue Description (cont'd)

- Identification of Lacks in Today's Practice
 - Maintenance method
 - monitoring tools works only reporting, decision by human
 - specific tool for specific parameter, separated
 - taking place every day
 - variety of control time among parameters



Timeliness (timely convenience) history

Integration and comprehensive result

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@ Issue Description (cont'd)

- Identification of Lacks in Today's Practice
 - Manual supervision is not scalable
 - lands increase, but human resources and time are limited
 - Skill and knowledge are necessary to formulate solution in case of problem occurred
 - Some "know-how" can be educated but most of these are not verbalized / theorized



Scalability

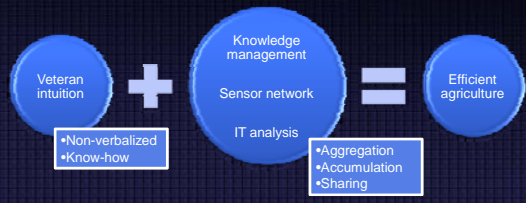


Knowledge sharing

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@ Solution (cont'd)

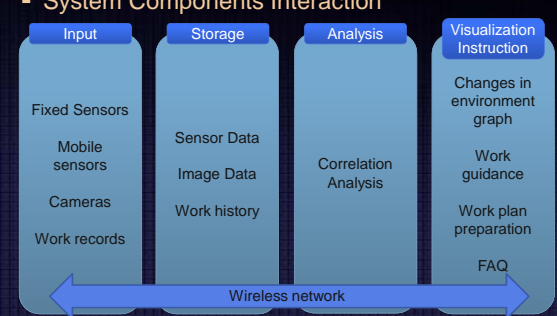
- System Concept Overview



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@ Solution (cont'd)


- System Components Interaction



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@ Solution (cont'd)

- Sensor example
 - eKoWeather Station Suite
 - Rain collector
 - Temperature & Humidity
 - Anemometer
 - Wind Speed & Direction
 - Barometric Pressure
 - Solar Radiation
 - Wireless Collaboration
 - Solar Powered



<http://www.xbow.jp/eKo.html>

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@ Solution (cont'd)

- Case study
 - Android Sensors (developer.android.com)**
Humidity sensors in the smart phones can be used as complement of sensors in artificial environment. We gather humidity data from smart phones via wireless communication and store them to a database. The data is used for now-casting. Their grain size is much smaller than climate satellite's grain size.
 - Auto fertilizer distribution system**
Crops' growing condition and sugar content is analyzed with using laser sensor. Based on this information, system will control the amount of fertilizer and distribute them automatically.

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@ Solution (cont'd)

- Knowledge sharing**
Sharing know-how between experienced and inexperienced people

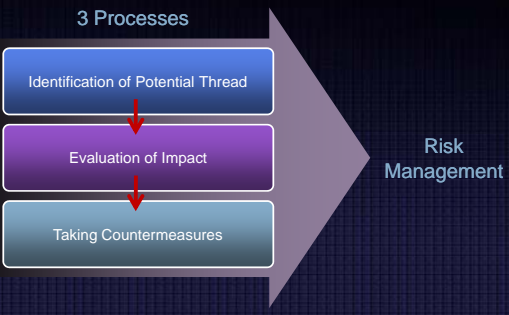
- Daily internal use**
Instruction/ advice from expert to farm workers to solve problem in the field based on correct understanding of natural events

- Publish and subscribe**
Farm people can publish their abstraction of the physical world, other interested parties can subscribe it


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@ Solution (cont'd)

3 Processes

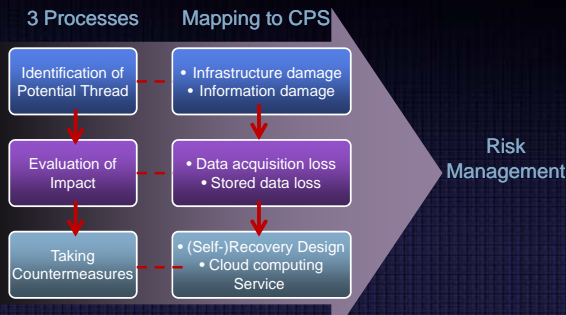


Risk Management

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@ Solution (cont'd)

3 Processes Mapping to CPS



Risk Management


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@ Closing

- New problems after application of CPS solution
 - Maintenance cost of dense infrastructure
 - Information leakage, potentially used by competitors or random attackers
 - How to upgrade the system technologies?
 - How to deal with network expansion (scalability issue)
 - No diversity, No option. To follow the indication of the system we have to use the same fertilizer and agrichemical.

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Comments and Questions are Welcome!

Thank You

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