FALL 2020 TPAC, WoT VF2F

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Rural Hybridization

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(Society 5.0 in Agriculture)

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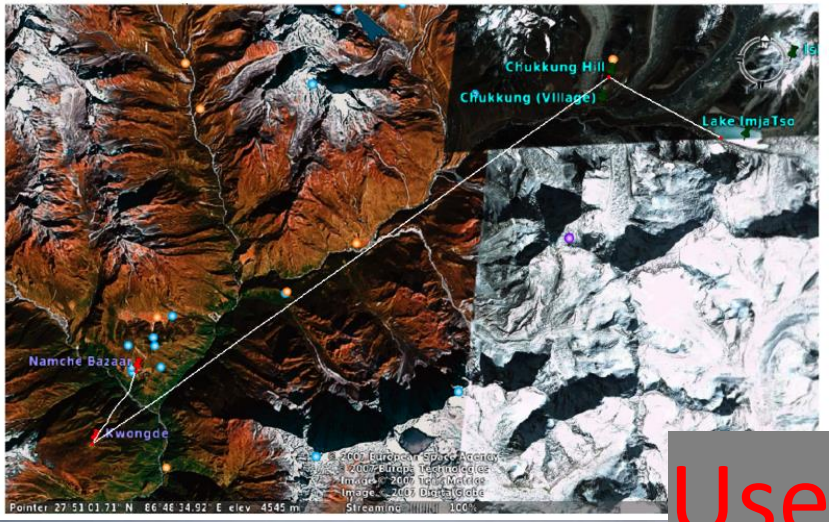
Field Server

- http://fsds.dc.affrc.go.jp/data1/model_job/FieldServer/
- Monitoring and Controlling device for Agriculture by NARO
  - Inspired by Sensor Web(NASA)
- Since 2002 – Prototype of Agricultural WoT?
  - Web Server running on PICNIC
  - Sensors/Switches
  - Web Camera
  - WiFi
- Open version : http://fsds.dc.affrc.go.jp/data1/OpenFS/

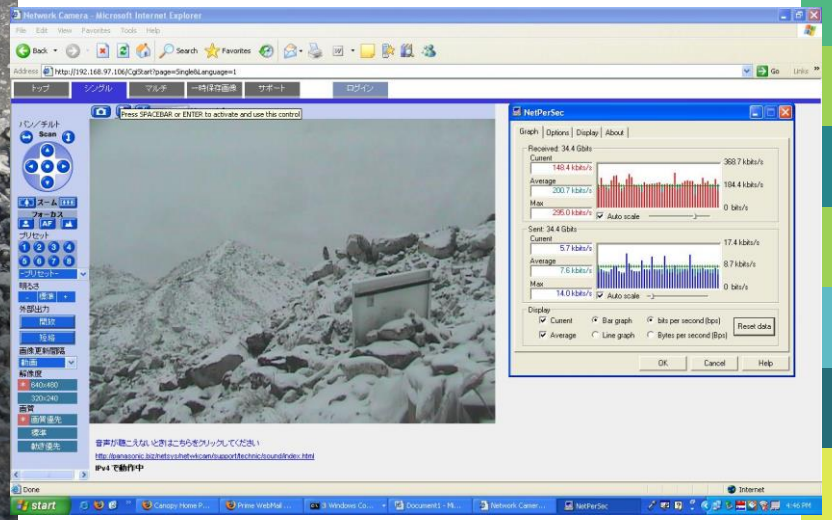
My reflections

- W3C Agriculture CG
  - Low Activities
- Asia Pacific Advanced Network (APAN https://apan.net/)
  - Collaboration with other WGs is not enough
    - WGs have own purpose.
- Agriculture Research
  - Current Smart Agriculture is not smart
    - Sometimes forget to monitor farmers (Trouble of agricultural machinery causes serious damage on farmers)
    - Many sensors to maintain
    - Many services to contract
    - PC/Smart Phone (difficult to use in muddy condition)
  - Early warning of landslides, early warning of flood damage, and other monitoring and early warnings are not enough.
  - Not consider the effects of agriculture in mental care

Imja Lake Monitoring with NREN



Useful for Early Warning!!



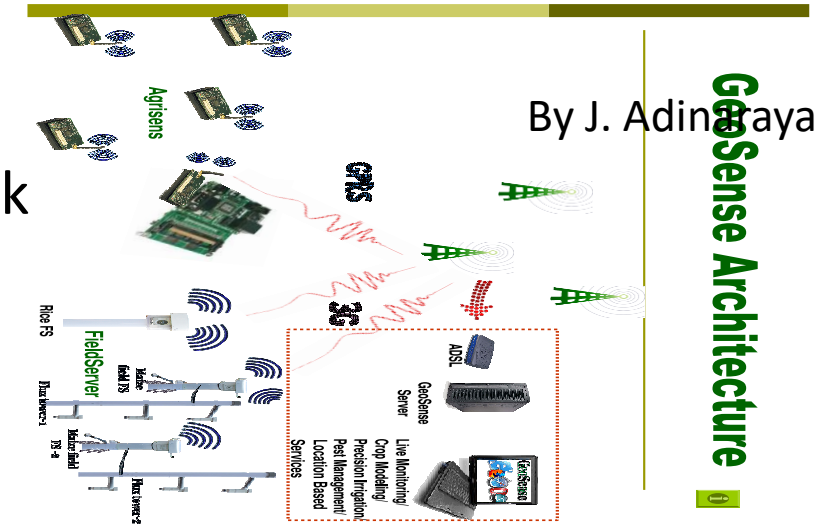
https://apan.net/meetings/hawaii2008/presentations/ag/04-NREN-25th%20APAN%20Hawaii%20Agriculture%20Session.pdf

Rural Hybridization?

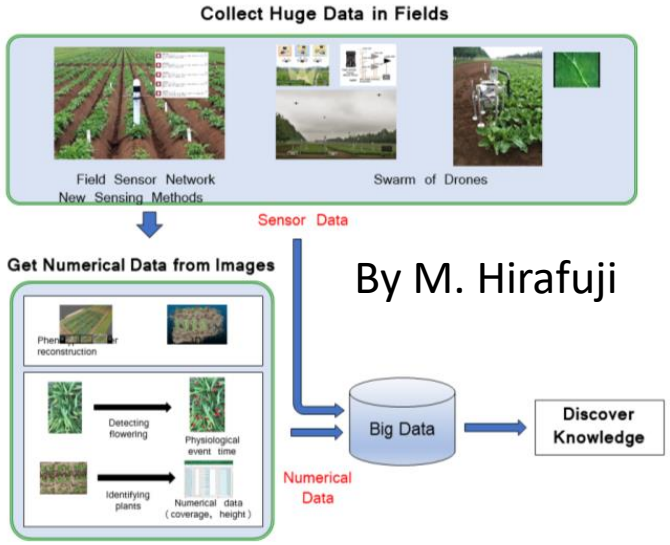
- Cyber – Physical Hybridization in Rural Area.
  - Realization of Society 5.0 in Rural Area
- Why Rural Area?
  - Hybridization in urban area seems to be commercially feasible.
    - Needs strategy in rural area.
  - Agriculture is main industry in rural area
- Related: “Open Field Smart Agriculture”
- For Better Quality and Resilient Life in Rural Area

Rural Hybridization?

- Technologies
  - 5G and Beyond (Wireless Network)
  - High-performance (Optical Fiber) Network
  - Augmented Realty
  - Artificial Intelligence
  - Cloud Computing/Service
  - Edge Computing
- Applications
  - Telemedicine
  - Cyber Arts, Digital/Video Archives
  - Smart Village, Smart Transportation, Smart Logistics
  - Smart Agriculture (Open Field, Green House)
  - Adaptations and Mitigations against Natural Disasters



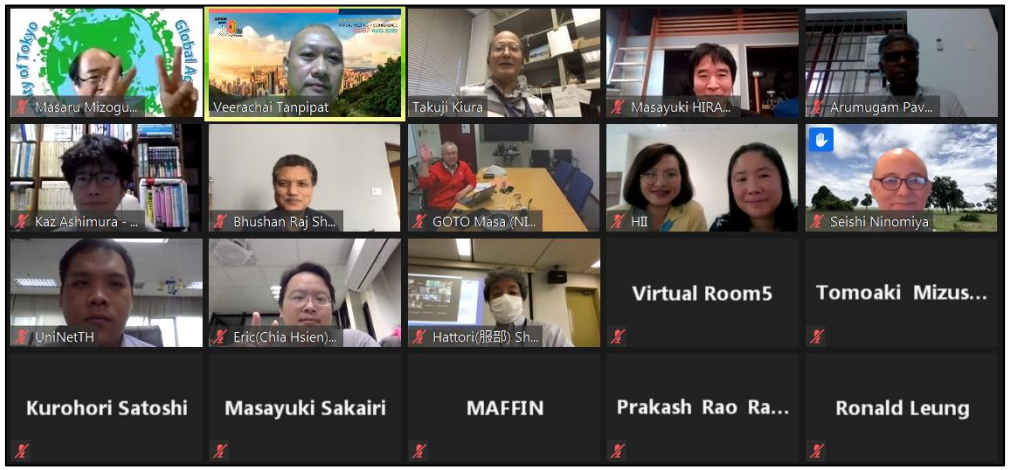
By J. Adinarayana



By M. Hirafuji

Rural Hybridization in APAN50

- Prof. Hirafuji
  - Field Computing, Big Data and AI
- Prof. Mizoguchi
  - Corona disaster will accelerate Japan's rural ICT infrastructure
- Dr. Ashimura
  - W3C Web of Things (WoT) Overview
- Discussion
  - Advantages and Disadvantages in rural area
  - Rural Hybridization in future APAN meetings
  - AgWG will propose in APAN51



https://apan2020.apan.net/?p=444

COVID-19

- reveals urban area is vulnerable to epidemic/pandemic
- accelerates data sharing and analysis in medical field
  - Contact tracking, Treatment, and Research Data
- with COVID-19
  - New Normal, Less F2F meeting, Less Travelling, Work at home, etc.
  - Cyber - Physical Festival via network
- new urban – rural relation
  - companies in rural area
  - companies having rural offices.

Reminds us the importance of rural area

WoT for Rural Hybridization

- Monitoring/Sensing Tools
  - Environment, Crop, Livestock, Wild Animals, Agricultural Machine, Human, Pet, etc.
    - Do not forget human is the best sensor.
- Information and Communication Tool
  - TV, Smart Phone, PCs, Tablet, Smart Watch, etc. => AR Device
- Automatic/Manual Remote-control
  - Smart Green House, Water Gate, Feeding, Milking, Agricultural Machine, Field Robot, etc.
- Interoperability of WoT devices is a key technology for Rural Hybridization

Language Resources in Agriculture

- Global Agricultural Concept Scheme (GACS)
  - https://agrisemantics.org/
  - Thesaurus by Food and Agriculture Organization(FAO, UN), National Agricultural Liberally(NAL, USA), and CAB International
  - Relations to other activities
    - https://agrisemantics.org/#adopers/
      - AgroPortal (Portal of Agronomic Ontologies)
        - http://agriportal.lirmm.fr/
      - GODAN (Global Open Data for Agriculture and Nutrition)
        - https://www.godan.info/
      - etc.

Summary

- “Rural Hybridization” means cyber-physical hybridization in rural area towards better quality and resilient life in rural area
- WoT devices are there
- Use cases
  - Tracking zoonotic diseases (human, wild animals, livestock, pets)
  - Emergency Activities (Human, Agricultural Machine, Green House, etc)
  - Network games to reduce damage on crop/livestock by wild animals (rural and urban)
    - required discussion with Animal Protection Groups
  - Telemedicine/Remote Care, Therapy
  - Logistics using UAVs
  - Transportation using unmanned vehices
  - etc.
- Needs strategy and collaboration with other fields