Seishi Ninomiya
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Specialized Field: Agricultural Information Engineering

Research Interests: Image processing / Image recognition, Bioinformatics, Modeling /Simulation, Computer network, ICT/Knowledge processing, Neural network and Deep learning

Short Biography:

Professor Seishi Ninomiya is one of the distinguished researchers in the field of agricultural informatics. He has been involved with a number of leading national and international research institutions besides the academic affiliation with University of Tokyo. Dr. Ninomiya was the head of Grid Computing Team of National Agricultural Research Center, National Agricultural Research Organization, Japan. He also led the laboratory of Data Analysis and System of National Institute Agro-Environ Science. He was actively involved with Asia-Pacific Advanced Network Consortium (APAN), Asia-Pacific Federation for Information Technology in Agriculture (AFITA), Center for Development Research (ZEF), University of Bonn, Germany. Professor Ninomiya led a number of renowned national and International projects for Japan, India, Thailand and China. Professor Ninomiya recently awarded most prestigious award in agriculture for his significant contributions in Japan.

Presentation Title: ***Time: 09:05- 09:50***

"How Should ICT Contribute to Agriculture"

Information and communication technology (ICT) such as the Internet and smart phones have been dynamically changing our life during the last decade. It has been also revolutionizing industries, sometimes creating totally new business model such as share economy. However, agriculture is not really sharing its benefit yet. Compared with other industries, agriculture has two specific features; uncertainty and site-specificity. Uncertainty is mainly caused by unpredictable environmental conditions while site-specificity is caused by varying local conditions of farming such as weather, soil, crops, cultivars and cultivation methods. These features require agriculture to be dynamically adjusted and customized, depending on time and locations.

We used to believe that efficiency of production can be achievable only by large scale mass production and that customization is costly. But, we know several examples that such customization was realized efficiently by using ICT. The concept of Industry 4.0 proposed by Germany, maximally utilizes IoT, bigdata and AI for very efficient customized productions. Considering above-mentioned features of agriculture, I expect that ICT should contribute to improving efficiency and sustainability of agricultural productions in many ways.

This presentation discusses about the current and future contributions of ICT to agriculture, showing practical examples regarding decision support, farm automation and knowledge transfer in agriculture.

Naoshi Kondo
Professor, Laboratory of Bio-Sensing Engineering, Division of Environmental Science and Technology, Graduate School of Agriculture, Kyoto University

President, Japanese Society of Agricultural Machinery and Food Engineers (JSAM)

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Specialized Field: Agricultural information engineering

Research Interests: Agricultural Process Engineering, Bio-instrumentation, Agricultural Robot, Sensing, Control and Informatization of Biological Objects, Agricultural Products and Foods

Short Biography:

Professor Naoshi Kondo has contributed in the field of agricultural engineering by his diverse research works in machine vision systems for crop image recognition, agricultural robots for fruit harvesting, cutting sticking robot in seedling production, fruit grading robots. Dr. Kondo has awarded by Japanese Society of Agricultural Machinery, Japanese Society of Mechanical Engineers, and Japanese Society of High Technology in Agriculture for hi-tech developments in agricultural robotics. His most successful innovations of the agricultural robots also commercialized. Dr. Kondo also utilized machine vision and Helmholtz resonance to focus on bio-sensing engineering targeting plants, beef cattle, chicks, cultured fishes in cages and shells. Professor Kondo is presenting serving as the President of Japanese Society of Agricultural Machinery and Food Engineering.

Presentation Title: ***Time: 09:50-10:35***

"Bio-Sensing Technologies for Solving the Trade-off Problem: Food-Environment -To reduce the food loss and waste- "

World is worrying about growing global population into 9 billion in 2045, because we need more food production and energy. Simultaneously, we should discuss on the environmental problems during the rapid growth such as global warming, air and water pollution, and soil deterioration. Since this global problem related to food and environment is a trade-off problem, we should solve it together by new technologies in many agricultural research fields with a global collaboration.

In this presentation, two ways to produce foods and keep environment will be proposed: one is to improve productivity in the field with mechanization, automation and informatization using robotics, AI, and IOT as well as precision agricultural concept "Minimum investment and Maximum benefits" with the minimum environmental loads. More important consideration should be paid to bio-sensing engineering technologies which can reduce the 30 % food loss and waste in the world: fluorescence properties of agricultural products, NIR spectroscopy techniques to predict chick hatching time, and Helmholtz resonance to measure fish volume to give the optimum feeding. Using the technologies, we need to save agricultural products which have been spoiled during storage and distribution after harvested, especially in tropical zone, to save the chicks which were killed because of early or late hatching and of gender mismatching, and to save water in the pond from contamination of too much feeding and chemicals by the optimum feeding growing aquacultural products based on measured volume. Another challenging matter is to save foods from wasting in the world at the consumption stage by Japanese "Mottainai" Spirit.

Noboru Noguchi
Vice Dean & Professor, Research Faculty of Agriculture,
Division of Fundamental Agriscience Research,
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Specialized Field: Agro-engineering / Agricultural information engineering

Research Interests: Vehicle Robotics, Bio-infotronics, Bio-robotics, Remote Sensing, Precision Agriculture

Short Biography:

Professor Noboru Noguchi has made a remarkable footprint nationally and internationally in the field of vehicle robotics. His application-based research of advanced technologies to agricultural systems has been contributed to both academic institutions and industries. Dr. Noguchi served as adjunct professor in the University of Illinois at Urbana-Champaign to develop the field robot by collaborating with U.S. industries. He is also recognized as the first pioneer to develop a fully autonomous field robot, collaboration with National Research Institute of Agricultural Machinery in Japan. Professor Noguchi is Director of SIP program for Japanese Cabinet and contributing in policy on advanced automation to government, Japan Society for Promotion of Science (JSPS) and the Science Council of Japan (SCJ) due his excellent expertise and notable contribution to society.

Presentation Title: ***Time: 10:35-11:20***

"Current Status and Perspectives for Smart Agriculture"

Agriculture in developed countries after the Industrial Revolution has tended to favor increases in energy input through the use of larger tractors and increased chemical and fertilizer application. Although this agricultural technology has negative societal and environmental implications, it has supported food for rapidly increasing human population. In western countries, "sustainable agriculture" was developed to reduce the environmental impact and production cost of agriculture. At the same time, the global agricultural workforce continues to shrink; each worker is responsible for greater areas of land. Simply continuing the current trend toward larger and heavier equipment is not the solution. A new mode of thought, a new agricultural technology is required for the future. Smart agricultural technologies including robotics and ICT are one potential solution. Information collection is an essential part of smart agriculture. The information gathered through remote-sensing and other sensing platforms such as weather station and telematics can be used to create field management schedules for chemical application, cultivation and harvest. This presentation will give current status and perspectives for smart agriculture. Particularly, I introduce the research activity to tackle these technical problems in Cross-ministerial Strategic Innovation Promotion Program (SIP) "Technologies for Creating Next-Generation Agriculture, Forestry and Fisheries", particularly about smart agriculture model by incorporating robotics, ICT, genome information, and other leading-edge technologies to produce a uniquely Japanese smart, ultra-laborsaving, and highly productive agriculture model.

K.C. Ting
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Specialized Field: Agricultural Automation, Systems Informatics and Analytics, Supply Chain and Logistics, Energy Efficiency, Environmental Impact, and Economic Feasibility.

Research Interests:

Controlled Environment Plant Production Systems, Biomass and Renewable Energy, Precision and Information Agriculture, Agricultural and Bio-systems Management, Intelligent Machinery Systems, Postharvest Processing and Handling.

Short Biography:

Professor K.C. Ting has been leading research teams to develop and implement methodologies for system scoping techniques, computer models, simulation and optimization results, and decision support systems for agricultural production and intelligent food systems. He has participated in proposal developments for four large successful research programs: NASA New Jersey Specialized Center of Research and Training, BP Energy Biosciences Institute, ADM Institute for the Prevention of Postharvest Loss, and USAID Sustainable Intensification Innovation Lab Appropriate Scale Mechanization Consortium. He has delivered over 130 invited presentations in 17 countries. He has participated in establishing international collaborative education and research programs between institutions in U.S. and countries in Asia, Europe, Middle East, South America, and Africa. He has received prestigious awards and honors including Fellows of American Society of Agricultural and Biological Engineers (ASABE) and American Society of Mechanical Engineers (ASME).

Presentation Title: ***Time: 11:20-12:05***

"Agricultural Intellimation"

Agricultural system is a very large-scale bio-based economic engine, which is a system of systems and can be broadly defined to include agriculture, food, energy, water, environment, climate change, economics, society, etc. Top-level physical components of an agricultural system may consist of production; processing & manufacturing; distribution & utilization; and finishing & maintenance. An intelligent agricultural system may be enabled through Intellimation that encompasses systems informatics & analysis and agricultural automation. The concepts of systems approach; concurrent science, engineering, and technology (ConSEnT); and analytics & decision support are fundamentally useful in systems analysis. Automation is to equip machines with human-like capabilities including perception, reasoning/learning, communication, task planning/execution, and systems integration. A future trend in advancing automated machines and physical systems operations, such as agriculture production and processing, is to add intelligence, in the forms of knowledge and wisdom, to the machines and operations, i.e. the concept of Intellimation. Agricultural intellimation may be implemented through a cyber-physical system platform. The Global Knowledge Initiative (GKI) has issued "invitations for innovation needed to transform food systems by 2035" in its report, published in October 2017, on "Innovating the Future of Food Systems." In response to the GKI's innovation challenges, some thoughts on transformational agricultural intellimation research and development are discussed in this presentation.

Md. Monjurul Alam
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&

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Specialized Field: Agricultural Machinery, Extension Dissemination, Value Chain Analysis

Short Biography:

Dr. Md. Monjurul Alam is a frontier researcher in the field of agricultural machinery and contributing over the years for extension dissemination of appropriate scale of agricultural mechanization. He is leading a project for preventing post harvest losses of major cereals in Bangladesh and also Project Director for Appropriate Scale Mechanization Innovation Hub funded by USAID and ADMI; Director for Green Energy Knowledge Hub funded by DANIDA and IFC. Dr. Alam has served as the Director of Bangladesh Agricultural University Research System to coordinate research management system for national and international donors.

Presentation Title**:* ***Time: 14:00-14:40

"Adaptation of Small Agricultural Machineries to Improve the Livelihoods of Farmers"

Bangladesh is predominantly an agricultural country and agricultural sector contributes about 14.2% to the GDP with a growth rate of 0.5%. Paddy is the main staple crop of Bangladesh accounting for 74.85% of total cropped area and 95% of cereal production (BBS, 2017). Since independence in 1971, the production of paddy has increased over three folds to 55.5 million tons compared to slightly more than double the population of 160 million and attains self-sufficiency against shrinking of agricultural land by 0.5% per year (FAO, 2014). However, by 2050 the population of Bangladesh would be about 222.5 million that need to double the production of paddy in Bangladesh. On the other hand, the current labor force employed in on-farm agricultural activities is about 43% would have been reduced to about 36.1% by 2020. Total number of rural households in Bangladesh is about 28.7 million of which 52.91% is farm households and 84.39% of it is small farm holding with an average size of 0.51 ha (BBS, 2017). Under the prevailing circumstances, Bangladesh agriculture is transforming from traditional to semi-intensive small holder mechanization. Since 1990s, the use of machines like tractor, two-wheel tractors (power tillers), irrigation pumps, threshers and other small equipment have been expanding. At present, about 90% of tilling, 95% of total irrigable land (66% of total cultivable land), 80% of insecticide application (by hand and knapsack sprayers), 70% of threshing is being done by small machines; and installed power per hectare is about 2.0 kW. However, transplanting, harvesting, drying and on-farm processing of crops are yet to be mechanized and farmers are eager to adapt machines in these areas. Few public and private sector initiatives have been taken to adapt appropriate machines for these operations. On-farm adaption studies revealed that use of small size transplanter, reaper, mini-combine harvester and dryer could save cost about 46%, 52%, 65% and 26% respectively over traditional practices. Similarly, conservation agricultural machines like zero-till planter, stripe-till planter, bed planter could save about 65%, 50%, 63%, respectively. On the other hand, reaper, mini-combine harvester and dryer could save a loss of 2.14%, 5.12% and 3.8%, respectively. These cost and loss reduction could mean a corresponding reduction in household food expenditure and roughly equaling 5 – 10% more household income and improvement in livelihoods.

Kriengkri Kaewtrakulpong
Assistant Professor
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Specialized Field: Agricultural Logistics and Supply Chain Management

Research Interests:

Agricultural System Simulation and Optimization, Decision Support System for Agricultural Production and Management, Information and Communication for Agriculture, Post-harvest Technology and Machinery, Biomass Feedstock, Developing and Testing of Agricultural Machinery

Short Biography:

Dr. Kriengkri is recognized for his achievements for agricultural logistics and supply chain management in Thailand. He has been successfully developed efficient food logistics support systems for industries. He is contributing with industries for his expertized knowledge on logistics, specially transportation and operational research. He is also working with the Ministry of Agriculture and Cooperatives, Thailand for developing IT projects. Dr. Kriengkri is a member of Japanese Society of Agricultural Machinery, International Society of Multi-criteria Decision Making and Thai Society of Agricultural Engineering.

Presentation Title: ***Time: 14:40-15:20***

"Biomass Feedstocks Logistics and Supply Chain Management Systems for Bioenergy Industry in Thailand"

Thailand is one large potential producer of bioenergy because of potential to produce huge amount of biomasses. However, such biomasses are produced seasonally and distributed over large geographical areas. Thus, the logistics strategic and decision-making tool for achieving an optimal use of agricultural biomass is needed. The biomass feedstocks logistics and supply chain management system for bioenergy industry in Thailand was developed. It was composed of two subsystems. The first subsystem was the strategic decision-making tool for biomass feedstocks logistics management. Because of available time, far distance to be handled, and characteristic as very voluminous materials affected the logistics efficiency and cost. Then, this subsystem was devised as multi criteria decision making tool and designed to provide the optimal location for bioenergy plant in Thailand. The field tests were done in order to check the field capacity of the processes, and heuristic technique were deployed to generate the daily supply plan through the year. The second subsystem was designed for focusing on the complex supply chains of the various potential feedstocks for liquid biofuel generation such as ethanol and biodiesel. Then, the Biofuel Database System was developed for managing the data in supply chain of ethanol and biodiesel production. The logistics structure and data flow starting from upstream to downstream of the chains were gathered. Such data is needed for several Thai government offices to meet several their purposes such as balancing the demand and supply chain, pricing of biofuel, and determining amount of import and export of biofuel.

Kudang Boro Seminar
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Specialized Field: Agricultural Information Systems

Research Interests: Precision Farming Systems, Multimedia and Web-based Applications, Development of Computer-based Control Systems for Agriculture, Distributed Artificial Intelligent System (Multi agent Systems)

Short Biography:

Professor Kudang Boro Seminar is one of the leading researchers from Indonesia working in the field of agricultural informatics. He was the president of Asian Federation for Information Technology in Agriculture (AFITA) and Indonesian Society of Agriculture Informatics (ISAI) and now serving as honorary member in both organizations. Dr. Kudang has research collaboration with renowned national and international research institutions like George Mason University (USA), Ehime and University of Tsukuba (Japan). He also worked as a coordinator for UNESCO E-Forum on Technology, Innovation and Policy. He has been developing software tools for supporting the implementations of smart application for livestock and poultry industries to ensure traceability of production.

Presentation Title: ***Time: 15:20-16:00***

"Integrating and Harmonizing Value-Chain Actors from Land to Consumers Through A Web-Based Traceability System"

Food production chains from land to consumers involve complex interactions and interconnections of actors each of which plays a certain critical roles in the transformation of foods starting from land (farmers) to consumers safely and timely. The problem is the interconnectedness of all actors in the value-chain is not easily traceable so that it is difficult to monitor and to ensure best practices performed by each actor in the chain, especially in Indonesia. This paper discusses integration and harmonization of value-chain actors through a web-based traceability system that has been developed and partially implemented for several food supply and production chains in Indonesia.

***Index Terms*—** actor network, food supply chain, food transparency, IoT, web technologies

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Specialized Field: Agricultural science in management and economy

Research interests: Farm Management, Agricultural Economics**,** Resource Economics

Short Biography:

Professor Matsushita Shusuke has contributed for developing decision support system for farm management agency, risk management analysis and consumers behavior of agricultural products and food. Dr. Shusuke is one of the highly contributing members of the Agricultural Economics Society of Japan (AESJ), the Farm Management Society of Japan and Japanese Society of Agricultural Informatics (JSAI). He received awards for his research contributions from the Japanese of Farm Management. Dr. Shusuke spanned his research to inline with agricultural information research domains to adopt the smart application by the farmers. Dr. Shusuke also received number of research grants from renowned organizations. His most recent project grant has received from Japan Society for the Promotion of Science/Challenging Research (Exploratory).

Presentation Title: ***Time: 16:00-16:40***

"Resilient and Vulnerable Livelihoods; Adopting Dynamic Context of Risk and Uncertainty"

In this presentation, a 'pathways approach' to addressing the governance challenges posed by the dynamics of complex, coupled, multi-scale systems, while incorporating explicit concern for equity, an adaption of appropriate technologies, and sustainability in development studies. It illustrates the approach in relation to risks, uncertainties and ambiguities which result. As seen from the examples in the field of agriculture and related industries, they must involve in both complex dynamics and radical differences in framing of them. Then two dimensions are proposed in this approach, outcomes and the likelihood of each outcome happening. For instance, according to the rationality of economic agents, producers, farmers and so on, are expected to adopt a crop selection behavior that is expected to achieve profit maximization and risk minimization. Risk in this case refers to a situation where there is confidence that probabilities can be calculated across a range of known outcomes. On the other hand, in case of uncertainty probability cannot exit. Finally, it is not the probabilities but the characterization of the outcomes themselves that is problematic under the condition of ambiguity. Furthermore, conditions of ignorance may arise, where we simply do not know what we do not know. These kinds of different categories of incomplete knowledge in relation to resilience and vulnerability of livelihoods may be illustrated in this small presentation.