Division of Super Distributed Intelligent Systems

Installation Period: April 1st, 2016 - March 31st, 2021

Members:

Director	**Munehiro TAKIMOTO**	Professor, Department of Information Sciences
	Hayato OHWADA	Professor, Department of Industrial Administration
	Kiyoshi DOWAKI	Professor, Department of Industrial Administration
	Kazuyuki KUCHITSU	Professor, Department of Applied Biological Science
	Hirohito KOJIMA	Professor, Department of Civil Engineering
	Shinichi KIMURA	Professor, Department of Electrical Engineering
	Hiroyuki NISHIYAMA	Associate Professor, Department of Industrial Administration
	Hiroshi TAKEMURA	Associate Professor, Department of Mechanical Engineering
	Kengo MOROHASHI	Associate Professor, Department of Applied Biological Science
	Taku HARADA	Junior Associate Professor, Department of Industrial Administration
	Tomofumi MATSUZAWA	Assistant Professor, Department of Information Sciences
Visiting Prof.	**Mitsuo GEN**	Senior Research Scientist, Fuzzy Logic Systems Institute

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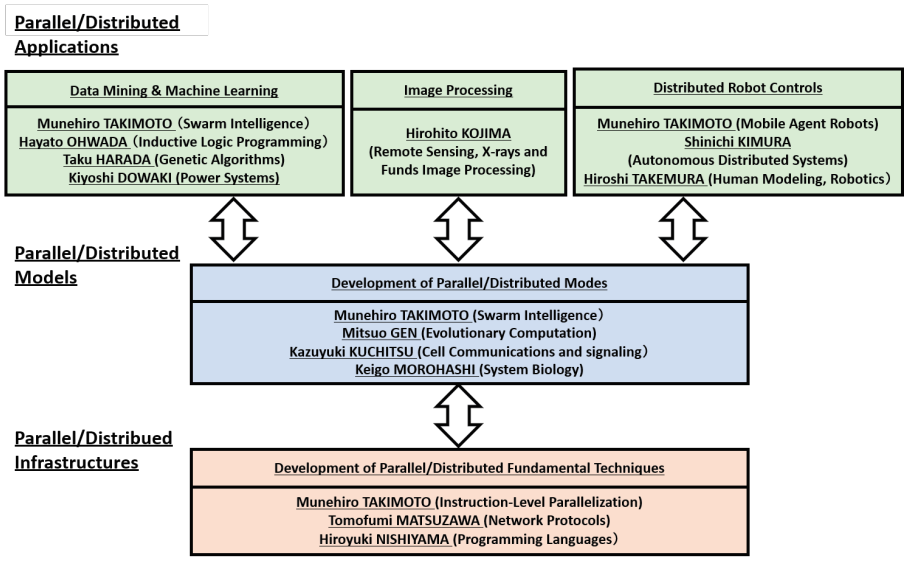
Objectives

Development of new parallelizing or distributing techniques in several level, and application of them to several areas including AI.

Members of the division and their relations



Research Topics

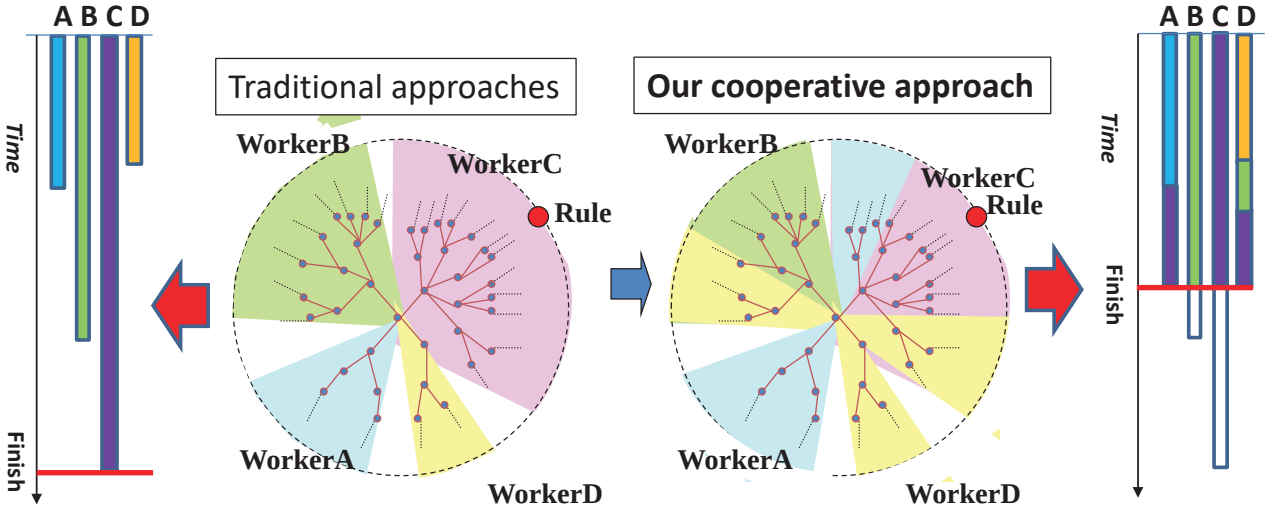
- improving system performance using application-level techniques such as a cloud computing.
- improving the parallelization and distribution techniques on various infrastructures.
- developing models for making infrastructures work more efficiently. Also, they develop new models through which the improvements of infrastructures directly lead to the speedup of applications.

Future Development Goals:

Development of highly parallelized/distributed AI systems that can handle manually processed huge data, and multiple robots for practical missions.

Research High Light ① Cooperation Based Parallel Logic Learning System

- **Idle workers steal jobs from other busy workers.**
- **Workers prune wasteful searches by sharing their estimation.**



■ **generation of rules for a large problem**
33,333 sec(≒9h15m)→1,053 sec(≒18m)
31.66 times(30CPU)

■ **generation of rules for a small problem**
147,992 sec(≒41h)→3,077 sec(≒51m)
48.10 times(30CPU)

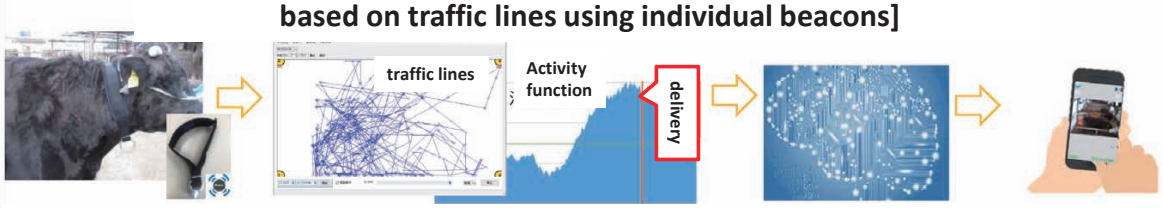
- **Improving robustness**(←mutual monitoring between workers)
- **Porting our system to cloud environments**

Research High Light ② Delivery Monitoring and Healthcare System

【Traditional approaches】: Sanitary problem, installation cost and stress for cattle

【Requirements】: Innovation based on an uninvasive approach covering large-scale farm

Innovation Consortium for Stress Free Rearing Managements
[Developing a delivery prediction and healthcare system based on traffic lines using individual beacons]



Installing beacons to neck-belts

Monitoring activity, movement distance, verbosity, positions, and feeding behaviors

Designing an algorithm for predicting delivery using A.I

Noticing delivery date

Demonstration farms	Beacon sensors	Demonstration research organizations	A.I.	Promotion
NAMIKI dairy farm ARIMURA farmers	Life laboratory	Kitazato University, Kagoshima University, Aomori institute Kohiruimaki medical service	Tokyo University of Science	Aomori area service

Applying ICT to stock farming and its demonstration and promotion

- Stress free delivery prediction system using sensors
- Noticing probability of it using IoT and A.I.
- Uninvasive delivery monitoring

➡ **Contribution to stable production of calves and decrease of users' load**