

【Grant-in-Aid for Scientific Research(S)】

Integrated Science and Innovative Science (Comprehensive fields)



Title of Project : Studies on Efficient Data Processing Techniques for Mobile Sensor Networks

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Research Area : Comprehensive fields

Keyword : Information systems

【Purpose and Background of the Research】

Recently, there has been a great deal of interest in sensor networks, which consist of sensor devices with communication facilities (sensor nodes) and process sensor data obtained by the sensor nodes. Here, almost all conventional studies on sensor networks aim to effectively gather data obtained by sensor nodes assuming that sensor nodes are deployed at fixed locations and do not move.

In this research project, we aim to establish flexible and efficient data processing techniques that make use of mobile sensor nodes such as cars, pedestrians, and robots (Fig.1).

【Research Methods】

Fig.2 shows the overview of our project. At an early stage of our project, we will separately conduct researches on three sub-themes for mobile sensor networks, (1) data allocation techniques, (2) data delivery techniques, and (3) data communication techniques.

Sub-theme (1) aims to establish techniques to allocate replicas of sensor data on multiple nodes considering the access frequency of each data and the communication situation of each node in order to achieve effective data acquisition and gathering. Sub-theme (2) aims to establish techniques to deliver sensor data obtained by sensor nodes in order to achieve fast data discovery and acquisition. Sub-theme (3) aims to establish communication techniques and protocols for effective communication among nodes in order to support the execution of the data allocation and delivery techniques.

At the next stage of our project, we will integrate the three sub-themes and propose efficient data processing techniques in mobile sensor networks.

Furthermore, we will verify the effectiveness of our proposed techniques through both simulations and experiments in a large-scale test-bed using real sensor nodes.

【Expected Research Achievements and Scientific Significance】

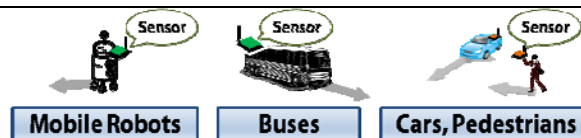


Fig.1: Examples of mobile sensor nodes.

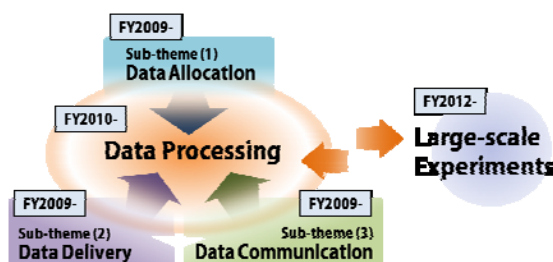


Fig.2: Overview of our project.

Our project aims to process sensor data flexibly and efficiently by making use of not only conventional static sensor nodes but also mobile sensor nodes. Therefore, our project has academic novelties and the potential to be internationally appreciated. Our project is expected to establish pioneering achievements and to take the lead in the research filed on mobile sensor networks in the world.

【Publications Relevant to the Project】

- Takahiro Hara, Sanjay Kumar Madria: Consistency Management Strategies for Data Replication in Mobile Ad Hoc Networks, IEEE Transactions on Mobile Computing, Vol.8, No.7, pp.950-967 (2009, to appear).
- Tomoki Yoshihisa, Masahiko Tsukamoto, Shojiro Nishio: A Scheduling Protocol for Continuous Media Data Broadcasting With Large-scale Data Segmentation, IEEE Transactions on Broadcasting, Vol.53, No.4, pp.780-788 (2007).
- Kriengsak Treeprapin, Akimitsu Kanzaki, Takahiro Hara, Shojiro Nishio: An Effective Mobile Sensor Control Method for Sparse Sensor Networks, Sensors, Vol.9, No.1, pp.327-354 (2009).

【Term of Project】 FY2009-2013

【Budget Allocation】 121,000 Thousand Yen