

## 論文の内容の要旨

論文題目      Study on Wireless Ranging and Positioning Methods Using  
Active RFID Tags  
(アクティブ RFID タグを用いた無線測距および測位の研究)

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Determining position and distance between objects is an important research area of the ubiquitous computing. The purpose of the ubiquitous computing is to provide context aware services to users by deploying small sensory devices to environment and obtaining surrounding contexts of environment using sensory devices. Especially location information is an important contexts in order to provide location based services to the user. This research studies low cost and scalable ranging and positioning methods based on the user-centric communication model using active RFID tags as location sensors.

This research considers three types of location information supported by the location information infrastructure and determines technical challenges associated with each location information type. The proximity detection system needs to satisfy following requirements: ad-hoc communication, real time detection, and scarce computing resource. The proposal for the proximity detection system is made that satisfies these features. For the relative and partial location system, localization methods based on TOF supported active RFID tags are proposed. For the absolute location system, proposals are made considering a large scale deployment, especially the method to capture RF signal characteristics and the one that calculates position of reference tags autonomously. For each proposed method, the effectiveness is evaluated by implementing the proposed method on a real hardware and by conducting field experiments. Lastly, the application of the partial location system is proposed which locates vehicles in indoor parking areas. From discussions on obtained results, proposals made for each location information type are effective, that is, proposals achieve high accurate localization, system's robustness, and scalability on the number of users.