

A Study on the Real-Time Measurement of Temperature and Humidity Based on Sensor tags

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Abstract. This paper is about a real-time measurement of temperature and humidity based on sensor tags. This study aimed to improve efficiency in the quality control of agricultural products and propose improvements in the cold warehouses of farms by obtaining quantified data through in-situ measurements of the environmental factors for storage of harvested agricultural products in a cold warehouse installed and operated on a typical farm.

Keywords: real-time, temperature and humidity, sensor tags

1 Introduction

The development of sensor network technologies is closely related to the development of its applied fields. As discussed in [1]-[4], the sensor network technologies utilized in agriculture may produce various types of results depending on the application purpose of the technologies. The efficiencies of the various types of sensor network technologies have been verified. Precise agriculture enables tailor-made agriculture for crops by monitoring the growth environment data for agricultural products, as well as the distribution of agricultural products with understanding of the delivery path of the products through tracking technologies. Many applications include fields related to management after harvest and quality management of the agricultural products with understanding of the distribution paths and providing the optimal path.

In the present case study, we designated temperature, humidity, and preservation period as the environmental factors for management and applied them to peaches. We obtained and analyzed temperature and humidity data in a cold warehouse based on the storage location (high or low, left or right). Furthermore, based on the obtained data, we identified problems and proposed improvements for existing cold warehouses operated on farms. In addition, for testing, we installed sensors and a monitoring system in the farm warehouse.

2 Applied System

In this study, we installed a hardware infrastructure comprising sensor tags, communication units, and a monitoring system, and carried out in-situ tests in the cold warehouse of a typical farm in order to study the effects of environmental factors of storage and management on the quality of peaches. First, Fig. 1 illustrates the configuration of the sensor tags, which are part of the hardware infrastructure, along with communication units and the integrated monitoring system. [1–4]

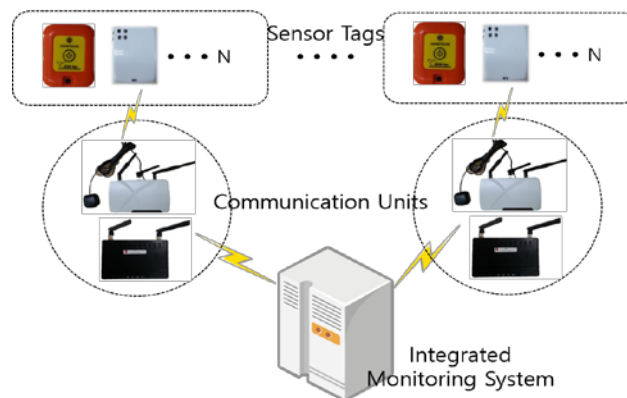


Fig. 1. Integrated Monitoring System (H/W)

3 Conclusion

The test results indicated that controlling the temperature and humidity, which are environmental factor data of cold warehouses on farms, could directly affect the quality of agricultural products. Moreover, based on these results, we concluded that there were significant differences in temperature and humidity depending on the height of containers located in the warehouse. Therefore, it is necessary to improve the farm warehouse system to manage temperature and humidity as environmental factors related to quality.

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References

1. Kwak, Y. S., Park, D.: Design and Implementation of the Application Service System Based on Sensor Networks. Communications in Computer and Information Science (CCIS) 184, pp.469–474,
2. Kwak, Y., Lee, J., Byun, S., Lem, J., Choi, M., Lee, J., Song, S.: Case Studies on Distribution Environmental Monitoring and Quality Measurement of Exporting Agricultural Products. Lecture Notes in Electrical Engineering 240, MUE (2013) Vol. 1, pp.35–42, May 9~11, Seoul, Korea
3. Lee, B., Kwak, Y.: Design and Implementation of the Data Collector of Sensor Tags”, Journal of KIIT. Vol. 12, No. 4, pp. 89-95, Apr. 30, 2014
4. Paull, R.: Effect of temperature and relative humidity on fresh commodity quality. Postharvest Biology and Technology, Volume 15, Issue 3, Pages 263–277, March 1999