Smart home sensing system using thermography camerae

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In conventional smart homes, services are often realized by installing sensors individually for each purpose. Furthermore, in order to construct a single service, a plurality of kinds of sensors are required. This causes the construction cost and the operation cost of the system to be raised, and the sensing system in the smart home is steadily becoming complicated.

On the other hand, it is said that human beings are getting visually more than 80% of information, suggesting that cameras as sensors have extremely high possibilities. It has been known that advanced sensing services such as identity identification and object feature identification can be realized by analyzing and image processing of images acquired by the camera. The image acquisition by the camera is a very sensitive information sensing system, but with the camera using the visible light, the problem of privacy is felt, but the resistance feeling is expected to be diminished for the thermographic image where the resolution is suitably dropped. Radiant heat that can not be measured with visible light not only greatly affects the comfort of the thermal environment but also is useful for finding abnormal operation of the equipment, but it was in a situation where it is hardly utilized at present . Although a thermographic camera as a device has been conventionally extremely expensive and large-scale, in recent years it has become possible to mount it extremely cheaply and compactly, and it is becoming possible to mount the same as other sensors.

The purpose of this research is to develop a measurement and extraction technology of plural physical quantities using a single thermographic device so as to construct a comprehensive sensing system that senses various situations in houses using a thermographic camera . Simultaneously acquire massive and effective data with one device, abstract one type of device into a plurality of devices, and provide an API to the service platform. This is also a new research direction given to the simplification of smart home system research or sensor application research.

In this research, we use one device of the thermography camera to diversify the data acquired by the facility and form several different types of data API. It also makes it possible to provide rich data support for services and applications of conventional smart home systems. At the same time, it is also possible to obtain physical quantities (footprints, average radiant heat) difficult to measure by normal means. By utilizing these data, it is considered very useful for research on human behavior analysis by comfort service or

machine learning. In the future gave new possibilities to the development of services in smart home systems.

Through the verification experiment of this research, the thermography camera was sufficiently proved the reliability and performance in the smart home sensing system. The accuracy of this device is somewhat inferior to other professional sensors (such as temperature sensors), but its response speed and sensitivity, and the vast amount of data support are very good. In addition to the information at that time obtained from the thermography camera, we also aim to acquire higher order information, together with time series information and information from other information sources. As a result, it is expected that the sensing system in the smart home can be made lower cost and more reliable.