

Title	ホームネットワークにおける異常状態のモデル化とその検知手法に関する研究
Author(s)	増田, 耕一
Citation	
Issue Date	2006-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/1966
Rights	
Description	Supervisor:丹 康雄, 情報科学研究科, 修士

Dynamic detection methods for abnormal situations in home network

Koichi Masuda (410108)

School of Information Science,
Japan Advanced Institute of Science and Technology

February 9, 2006

Keywords: home network, LegacyDevice, monitoring system, appliance model, sensor network.

This paper proposes dynamic detection methods for abnormal situations in home network. Abnormal situations mean abnormal behavior of home electric appliances which including not only networked appliances but traditional electric appliances. We have been researching "Legacy Device Home Network System" which can make home network system mainly with traditional electronic appliances. So we model the abnormal situations and examine a way to achieve the abnormal detection system by enhancing "Legacy Device Home Network System".

Home electric appliances become high performance and have come to have various functions in recent years. As well networked appliances add values of our life. This situation means many electric appliances in our houses are connected to outside network "the Internet". In other words there are fears of computer viruses which attack home electric appliances. And it becomes easy for malicious third parties to cause abnormal situation by control our appliances. On the other hand generally many users use a home network system and register many services one by one, so incidentally unexpected accidents are occurs. Therefore observation of appliances must be going to become the most basic and principal service in home network in the future. However, a system which observes behaviors of multiple networked appliances is not achieved yet. And only intruder detection

and fire detection services are currently offered as home network security services. So we propose dynamic detection method to detect dangerous and inefficient situation in home network systems.

At first, we define abnormal situations in home network from the viewpoint of safety and energy saving. To define abnormal situations we use information of appliances and their environments. Environment information means position of operator, validity of appliance service targets and indoor temperature etc. For example, air conditioners have their service target as a room where they installed. In case of a refrigerator, service target is inside food. The system checks this information by using various sensors out appliances.

Secondly, to manage state transition of appliances easily and judge abnormal situation with common standard we make abstract classification model of appliances under the observation by using these environment items and ideas based on basic appliance functions. With appliance classification model you can change criteria for judging abnormal situations at common timing. And you can manage appliances without necessity for consideration difference of detailed function between consumer electronics.

Thirdly, we propose a method of describing dynamic detection rule for abnormal situations in home network, and examine the method of enhancing Legacy Device Home Network System. The rule is basically composed of three types; the application rule, the observation rule, and the lifting rule. The observation rule has two subtypes, one set at all times and the other sets when a specific event occurs. The specific events are defined by the application rule. When the lifting rule satisfied, the observation rule and the lifting rule become invalid and the application rule is applied again.

At last, we examined covering of abnormality we defined in this paper. For covering evaluation, we used cases of appliance accident that had actually occurred in the past as a sample. As a result, it was able to be concluded that the possibility of the prevention of accidents was high in the proposal system that was able to detect the temperature change of the large area because most of the samples corresponded to generation of heat, the ignition. However, the evaluation of efficiency like as uninhabited operation is insufficient. So we should have an actual use in the future,

and do a more quantitative evaluation.

In conclusion, we can say that the serviceable detection system for abnormal situations in home network which have scalability can be constructed easily by using proposed dynamic detection methods.