SYSTEM INTEGRATION

Remote Diagnosis Methodology for Intelligent Machines

This research is aimed to construct a remote diagnosis system for autonomous mobile robots. Here the event-robot and symptom-cause description methods and a novel diagnosis method by taking advantage of active moving abilities of autonomous mobile machines are proposed. Moreover, considering a mobile robot as a local virtual management object among the network system management system, the widely used SNMP (Simple Network management Protocol) can be used as the protocol for communication of diagnosis information between the robot and manager. The effectiveness of the proposed approach is demonstrated by experiments carried in a prototype diagnosis system of a mobile robot with low level intelligence.

The concept of proposed method includes four items as shown following: (1) Attract event information from time series sensor data by filtering. (2) Description of event-robot status relation and symptom-cause inference in object-oriented network model language. (3) Approve the reliance and accuracy by using the active sensing ability of mobile machines. (4) Consider the diagnosis object (a mobile robot) as a virtual local network system, sensors are just treated as virtual hosts of this local network. Thus the diagnosis communication between manager agent and the robot can be embedded in the SNMP messages and transmitted within the inter-network.

Fig.1 shows the construction of the diagnosis system. Fig2 shows the thrust of concept 3. Fig3 and Fig4 just show parts of experimental results carried on the proposed diagnosis system.

Keywords: Fault Diagnosis, Mobile Robot, Network Management System, SNMP

References

1) Tao Yan, Jun Ota, Akio Nakamura and Tamio Arai: “Fault Diagnosis for Mobile Robots (First Report: Proposal of Basic Concept)”, Proc. of the 1999 JSPE Annual Spring Conference, March 1999 (in Japanese).

2) Tao Yan, Jun Ota, Akio Nakamura and Tamio Arai: “Fault Diagnosis System for Mobile Robots,” Proc. of JSME Conf. on Robotics and Mechatronics ’99 (ROBOMEC ’99), Tokyo, June 1999 (in Japanese).

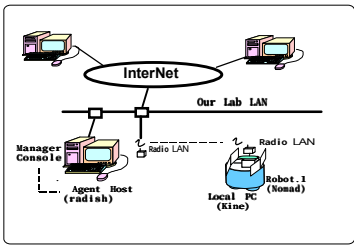

Fig.1 System structure

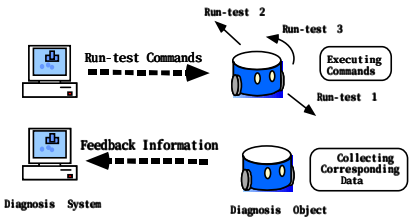

Fig.2 Active sensing diagnosis

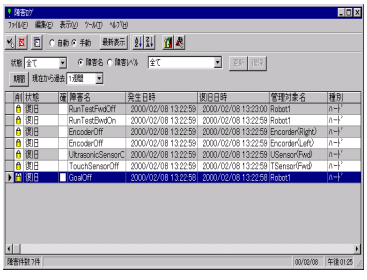

Fig.3 Fault event log screen

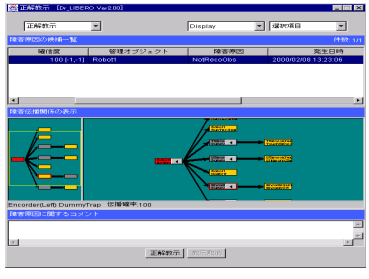

Fig.4 Diagnosis results