

Research highlights

Sensing technology: Motherboard monitoring inspired by the immune system

The prevalence of computer networks for sharing resources places increasingly high requirements on the reliability of data centres. The simplest way to diagnose abnormalities in these systems is to monitor the output of each component but this is not always effective.

Now Haruki Shida, Takeshi Okamoto and Yoshiteru Ishida at Toyohashi University of Technology have drawn inspiration from biological immune systems to develop a new model for detecting abnormal operation of network components more accurately.

Their model mimics biological immune systems where cells test each other to protect against disease. In the immunity-based diagnostic model, the sensors for the individual components are also linked for mutual testing. An algorithm determines the credibility of each sensor from comparisons of output from other sensors in the network.

The researchers tested the approach in a simulation of a mother board where they monitored the temperature, voltage and fan speed of the central processing unit and core. The immunity-based diagnostic model identified abnormal nodes more accurately than isolated sensors.

The researchers also developed a hybrid network combining isolated and immunity-based sensing. Here the immunity-based diagnostic model used a correlation-based network, which removes connections between sensors that have weakly correlated output. Compared with the fully connected network, the hybrid model further improved the accuracy of the tests.

The work will contribute to identifying abnormal component behaviour to avoid system failure.

Reference:

Haruki Shida¹, Takeshi Okamoto¹ and Yoshiteru Ishida²
Immunity-based diagnosis for a motherboard
Sensors, **11**, 4462–4473 (2011).

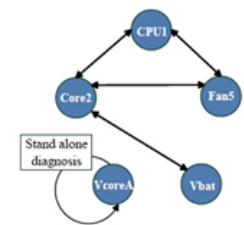
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¹Department of Information Network and Communication, Kanagawa Institute of Technology 1030, Shimo-ogino, Atsugi, Kanagawa 243-0292, Japan

²Department of Knowledge-Based Information Engineering, Toyohashi University of Technology, 1-1, Tempaku, Toyohashi, Aichi 441-8580, Japan



Yoshiteru Ishida



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Example of a hybrid diagnostic model.