

Computer Science 773

Robotics and Real-time Control

PSYCHOLOGY

WHO'S IN CHARGE ?

Three models : the computer can be a slave, a consultant, or an overlord.

Putting the machine in charge is not acceptable to society. They want people there, mainly for emotional rather than rational purposes, but there is a good reason : people are still immeasurably better at reacting to unforeseen emergencies than machines are. But it's often true that, apart from emergencies, the machines do the jobs much better.

INFORMATION.

In a highly automated plant, there is no reason why the engineers running the system should need to know all the tiny details of what's happening at the process level. Data presented should be kept to the minimum, making sure that everything essential is included.

But what if the controllers begin to wonder whether some part of the plant is in fact working properly ? If they can't get the detailed information which will give them the answer, they are quite likely to spend lots of time trying to subvert the system to get the information, or to lose confidence in the system, or both. There should therefore be ways to get any information used by the system, even if it's not normally needed.

Even that has its drawbacks. After checking a few worries and finding that in fact all is well, people can easily become overconfident, and assume that the control system will always cope with little problems.

ALERTNESS.

If you keep people there to react to emergencies, what do they do when there isn't an emergency ?

ALARMS.

What should the system do when there is an emergency ?

It should not terrify the operators by setting off all the alarm bells, light, signals, and other devices in the factory. It should not overwhelm them with information, most of which is likely to be useless. (After all, if the control system knew enough about the emergency to work out what was wrong, it wouldn't be an emergency. That's an overstatement, but there's some sense in it.)

Ideally, the system should attract the operators' attention urgently but without undue hysteria, do what it can to make sense of the information which has led it to diagnose an emergency, and present relevant information. In some cases, it is possible to produce different hypotheses as to the cause of the emergency, and to rank them in order of probability; if so, do so, as any relevant information is likely to be helpful, but it should be presented particularly clearly and simply.

Alan Creak,
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