Key human activities are increasingly dependent on the effective operation of computer systems in continually changing environments. Affected application domains range from healthcare and transportation to e-government and space exploration.

Software engineering research carried out at Aston has devised new approaches for the development of adaptive, context-aware and self-managing computer systems. The application of these approaches requires less effort and expertise compared to previous solutions, and produces adaptive computer systems capable of high levels of predictability and robustness through the run-time use of software engineering techniques from areas including:

- formal methods
- model-driven development
- automated code generation
- autonomic computing

Dynamic power management

The run-time quantitative analysis of a continuous-time Markov chain is used to achieve optimal trade-offs between the performance and the power usage of a disk drive.

[Radu Calinescu, M. Kwiatkowska – Using quantitative analysis to implement autonomic IT systems. 31st Intl. Conf. Software Engineering (ICSE 2009).]

Quality of service optimisation

Service-based system reliability and performance are optimised through:
1. adaptive selection of third-party services;
2. variation of in-house service resources.


Adaptive resource allocation

The limited amount of bandwidth available to mobile robots is adaptively allocated to the tasks whose execution maximises the robot utility in each given scenario.


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