



# Immunising Automated Teller Machines (ATMs)

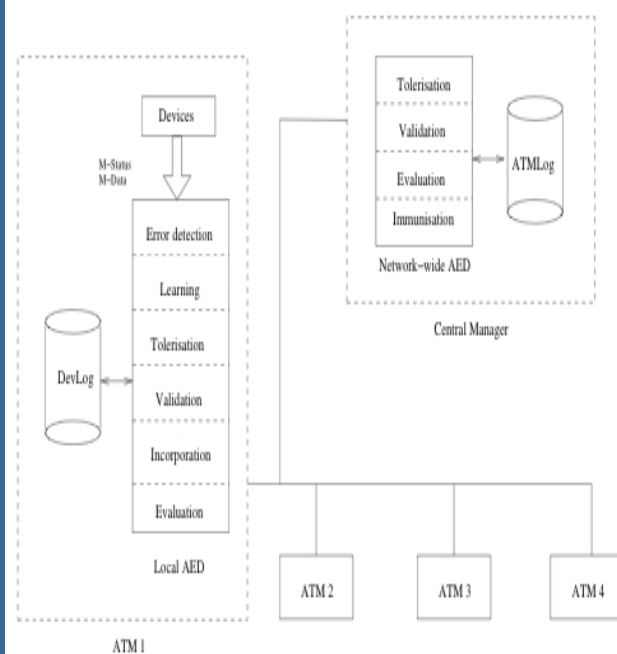


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## Scope of Work

NCR is working in partnership with The Universities of York and Kent, investigating the exploitation of immunological metaphors for increasing availability of Automated Teller Machines.

## Framework for Adaptable Error Detection

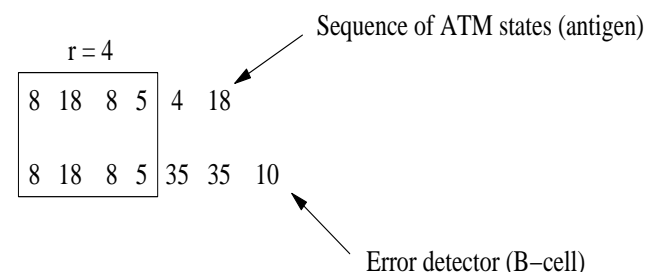


## Overview of the Framework

- *Local Adaptable Error Detection* - ATMs are able to learn their corresponding pattern of usage, which is used for future predictions and recommendations for maintenance;
- *Network Wide Adaptable Error Detection* - The system can be distributed amongst different families of ATMs;
- Novel undesired changes learnt by the system can be distributed to other ATMs.

## Data Representation

- M-status is nominal data which is a high-level representation of the state of an ATM;
- Data taken from cash handler in the ATM;



## System Capabilities

- Mean time to failure of 3 hours average;
- Continuous learning of new error condition;
- Capable of adapting to local environment;
- Stable memory over the operation of the ATM;

## Project Status

- Initial prototype system capable of identifying precursors to failure;
- Two patent applications filed;

## Future Direction

- Formed the basis for further investigations of immune inspired solutions on ATMs;

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## Publications

- Immune-Inspired Adaptable Error Detection for Automated Teller Machines. R. de Lemos, J. Timmis, S. Forrest and M. Ayara. IEEE Transactions in Systems, Man and Cybernetics (accepted for publication);
- Immunising Automated Teller Machines. M. Ayara, J. Timmis, R. de Lemos and S. Forrest. ICARIS 2005;
- Towards Immune Inspired Fault Tolerance. J. Timmis, R. de Lemos, M. Ayara and R. Duncan. ICONIP 2002;
- Negative Selection: How to Generate Detectors. M. Ayara, J. Timmis, R. de Lemos, R. Duncan and L. N. De Castro. ICARIS 2002;

## Acknowledgements

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