

*Phd course on*  
*Formal modelling and analysis of interactive systems*

*Part 6*  
*Examination Assignments*

---

*Antonio Cerone*

*United Nations University*

*International Institute for Software Technology*

*Macau SAR China*

email: `antonio@iist.unu.edu`

web: `www.iist.unu.edu`

# *Report 1 — References*

## User Interface Design

- Judy Bowen and Steve Reeves.  
[Formal models for user interface design artefacts](#), Innovations Syst Softw Eng (2008) 4, pages 125–141 (2009).
- Judy Bowen and Steve Reeves.  
[Refinement for user interface designs](#), Formal Aspects of Computing (2009) 21, pages 589–612
- Judy Bowen and Steve Reeves.  
[UI-Design Driven Model-Based Testing](#), FMIS 2009, ECEASST 22, 2009

# *Report 1 — Description*

## User Interface Design

Type: written report

Describe the semi-formal approach by Bowen and Reeves and discuss which aspects could be fully formalised as well as those aspects for which it would not be feasible to attempt a formalisation. Motivate your claims in terms of challenges and technical difficulties. Whenever feasible, give one or more simple example(s) of possible formalisation.

# *Report 2 — References*

## **Salience and Expectatancy in Attention**

- Li Su, Howard Bowman and Philip Barnard.  
Performance of Reactive Interfaces in Stimulus Rich  
Environments, Applying Formal Methods and Cognitive  
Frameworks, ENTCS 208 (2008), pages 95–111
- Rimvydas Ruksenas, Jonathan Back, Paul Curzon, and Ann  
Blandford.  
Verification-guided modelling of salience and cognitive load,  
Formal Aspects of Computing (2009) 21, pages 541–569

# *Report 2 — Description*

## **Salience and Expectancy in Attention**

Type: **written report**

Salience is the state or quality of an item that stands out relative to neighboring items. Saliency detection is a key attentional mechanism. Survey the papers and develop ideas and/or models in one of the following directions:

- salience mechanisms in the ATM case study
- salience of graphical interfaces and their impact on attention
- interplay of salience and expectancy as attentional mechanisms

# *Report 3 — References*

## Planned vs. Reactive Behaviour

- Rimvydas Ruksenas, Paul Curzon and Ann Blandford.  
*Modelling Rational User Behaviour as Games between an Angel and a Demon*, SEFM 2008, IEEE Press, pages 355–364.
- Thomas Anung Basuki, Antonio Cerone, Andreas Griesmayer and Rudolf Schlatte.  
*Model-Checking User Behaviour Using the MAUDE Rewrite System*, Formal Aspects of Computing 21 (6), 2009.

# *Report 3 — Description*

## **Planned vs. Reactive Behaviour**

Type: **written report**

Survey the two paper with a critical emphasis on the planning and reactive behavioural aspect of the user's rational behaviour. Relate the work in the papers to case studies illustrated during the course.

# *Report 4 — References*

## Model of ATM using Abstract Data Types

- Thomas Anung Basuki, Antonio Cerone, Andreas Griesmayer and Rudolf Schlatte.

Model-Checking User Behaviour Using the MAUDE Rewrite System, Formal Aspects of Computing 21 (6), 2009.

- Markus Roggenbach

CSP-CASL — A New Integration of Process algebra and Algebraic Specification.



# *Report 4 — Description*

## Model of ATM using Abstract Data Types

Type: code development and short written report

Model aspects of the ATM case study seen during the course using a formalism or tool equipped with abstract data types, such as Maude or CSP-CASL. Try to model and possibly verify some quantitative aspects.

# *Report 5 — References*

## Qualitative Extension of the ATC Case Study

- D. Leadbetter, P. Lindsay, A. Hussey, A. Neal and M. Humphrey.  
Towards Model Based Prediction of Human Error Rates in  
Interactive Systems, 2000
- S. Connelly, P. Lindsay, A. Neal and M. Humphreys.  
A formal model of cognitive processes for an Air Traffic Control  
Task, 2001
- Antonio Cerone, Simon Connelly and Peter Lindsay.  
Formal Analysis of Human Operator Behavioural Patterns in  
Interactive Surveillance Systems In Software, and Systems  
Modelling 7(3), Springer, 2008, pages 273-286.

# *Report 5 — Description*

## Qualitative Extension of the ATC Case Study

Type: code development and short written report

Extend the ATC Operator Choice Model using CSP or other formalism, possibly running a simulation or/and performing model-checking using a tool.

The extension should include the inclusion of an high-level model the short-term memory and/or episodic memory.

# *Report 6 — References*

## Quantitative Extension of the ATC Case Study

- J. Wicks, S. Connelly, P. Lindsay, A. Neal, J. Wang and R. Chitoni  
Simulation of Air Traffic Controllers' Behaviour Using the Operator Choice Model, 2006
- Tran Thi Bich Hanh and Dang Van Hung  
Verification of an Air-Traffic Control System with Probabilistic Real-time Model-checking, 2007
- Antonio Cerone, Simon Connelly and Peter Lindsay.  
Formal Analysis of Human Operator Behavioural Patterns in Interactive Surveillance Systems In Software, and Systems Modelling 7(3), Springer, 2008, pages 273-286.

# *Report 6 — Description*

## Quantitative Extension of the ATC Case Study

Type: **written report**

Survey of papers with commented description and judgement of the approaches and presentation of own ideas regarding possible future research work

# Report 7 — References

## Trust in Interaction and Usability

- A. S. Patrick, Pamela Briggs and Stephen Marsh.  
[Designing Systems That People Will Trust](#) Chap. 5 of Security and Usability, L. F. Cranor and S. Garfinkel (eds.), 2005, pages 75–100.
- Chris Nodder.  
[Users and Trust: A Microsoft Case Study](#) Chap. 29 of Security and Usability, L. F. Cranor and S. Garfinkel (eds.), 2005, pages 589–605.
- Punam Bedi and Hema Banati  
[Assessing User Trust to Improve Web Usability](#), Journal of Computer Science 2 (3), pages 283–287, 2006
- J.-F. Bonnefon, D. Longin and Manh-Hung Nguyen  
[A Logical Framework for Trust-related Emotions](#), FMIS 2009, ECEASST 22, 2009

# *Report 7 — Description*

## **Trust in Interaction and Usability**

Type: **written report**

Survey the papers highlighting the impact of trust to usability and analyse the role of emotions in trust.

End