Phd course on

Formal modelling and analysis of interactive systems

Part 6
Examination Assignments

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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 end 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 behehavioural 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 equiped 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.
- A. S. Patrick, Pamela Briggs and Stephen Marsh.
  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