

Table of Contents

Acknowledgements	I
Table of Contents	III
Table of Figures	VI
Table of Tables	IX
Table of Listings	X
1 Introduction	1
1.1 Motivation	2
1.2 Research Problem, Scope, and Approach	3
1.3 Contribution of the Thesis	4
1.4 Structure of the Thesis	5
2 Presence and Availability in HCI	6
2.1 Underlying Concepts.....	6
2.1.1 Privacy, Self-Disclosure, and Impression Management	6
2.1.1.1 Privacy	6
2.1.1.2 Self-Disclosure and Impression Management.....	12
2.1.1.3 A HCI Perspective on Privacy, Self-Disclosure, and Impression Management.....	14
2.1.1.4 Conclusions	19
2.1.2 From Interruptibility to Availability and Presence	19
2.1.2.1 Interruptibility	19
2.1.2.2 Availability and Presence	26
2.1.3 An Awareness Perspective on Presence and Availability.....	29
2.1.3.1 An Introduction to Awareness	29
2.1.3.2 Presence and Availability in Awareness Research	31
2.1.3.3 Presence Services and Availability Management Systems— Conceptions, Chances, and Challenges.....	32
2.2 Instant Messaging	37
2.3 Ubiquitous and Mobile Computing	40
2.4 An Overview of the Related Work—Systems for Presence and Availability Management	44
2.4.1 Explicit Availability Management through Manual Adaptation	45
2.4.2 Implicit Availability Management in Early Systems for Awareness	46
2.4.3 Combining Availability Management and Communication	48
2.4.4 Availability Management Approaches in Ubiquitous and Mobile Computing	53
2.4.4.1 Availability Management for Mobile and Nomadic Users	53

2.4.4.2	Availability Management in the Users' Environment	55
2.4.5	Availability Management Approaches in Automatic Calculation	57
2.4.6	Summarising the Related Work	63
2.5	Conclusions	64
3	Understanding User Needs for Selective Information Disclosure and Availability	67
3.1	Patterns in Selective Information Disclosure.....	67
3.1.1	Concept of Disclosure Templates.....	68
3.1.2	User Study and Results	70
3.1.3	Interaction Concept and Conclusion	73
3.2	An Experience Sampling Study on Selective Availability	74
3.2.1	Study Design—Availability Levels and Availability Categories	76
3.2.1.1	The Concept of Availability Levels	76
3.2.1.2	Defining Availability Categories through a Pre-Study.....	78
3.2.2	Study Design—Technical Means for the Data Collection	82
3.2.3	Study Execution	86
3.2.4	Results of the Experience Sampling Study	88
3.2.5	Conclusions.....	92
3.3	Discussion.....	92
4	Towards the Automatic Adaptation of Selective Availability	94
4.1	Analysing the Predictability of Selective Availability	95
4.1.1	Data from Experience Sampling Study	96
4.1.2	Feature Engineering—From Raw Sensor Data to Meaningful Features	99
4.1.2.1	Extracting Features from Sensor Data.....	101
4.1.2.2	Constructing Features Taking Time into Account	105
4.1.2.3	Selecting the Best Feature Subset.....	106
4.1.3	Algorithm and Parameter Selection.....	108
4.1.4	Classification Results and Discussion.....	109
4.1.4.1	Lessons Learned—Predictive Power of Individual Sensors.....	112
4.1.4.2	Lessons Learned—Personal versus General Models.....	114
4.1.4.3	Lessons Learned—Patterns for Selective Availability Configurations	116
4.1.5	Conclusions.....	118
4.2	Considerations and Requirements for Building Adaptive Systems	118
4.3	Exploration for an Architecture for Personalised Adaptations.....	121
4.3.1	LocaRhythms	121
4.3.2	CoDaMine	124

4.4	Continuously Sensing the Context.....	125
-----	---------------------------------------	-----

5	LiLoLE—A Framework for Stream-based Active Learning	133
----------	--	------------

5.1	A Rationale for Stream-based Active Learning.....	134
-----	---	-----

5.2	Stream-based Active Learning from Sensor Data Streams.....	138
-----	--	-----

5.2.1	Step One—Temporal Discretisation: Resampling and Segmentation	142
-------	---	-----

5.2.2	Step Two—Feature Engineering: Online Feature Extraction, Construction and Selection	144
-------	---	-----

5.2.3	Step Three—Active Learning: Classification and Training	147
-------	---	-----

5.2.4	Step Four—Querying and Adapting.....	149
-------	--------------------------------------	-----

5.3	Proof-of-Concept Implementation of the Framework	151
-----	--	-----

5.3.1	Overview of the Software Architecture.....	151
-------	--	-----

5.3.2	Implementation of the PRIMI Advanced Sensor Suite	153
-------	---	-----

5.3.2.1	Implementation of Sensor Plugins.....	155
---------	---------------------------------------	-----

5.3.2.2	The PASS Daemon and GUI.....	161
---------	------------------------------	-----

5.3.3	Implementation of the Stream-Based Active Learning.....	163
-------	---	-----

5.3.4	Implementation of the ActuatorDaemon and the Adaptation.....	165
-------	--	-----

5.4	Validation of the Stream-Based Active Learning Concept.....	166
-----	---	-----

5.4.1	Validating the Usability and User Experience	167
-------	--	-----

5.4.2	Validating the Machine Learning Performance	167
-------	---	-----

5.4.3	Validating the Technical Feasibility and Performance.....	170
-------	---	-----

5.4.4	Final Result and Discussion	173
-------	-----------------------------------	-----

6	Concluding Remarks and Outlook to Future Work	175
----------	--	------------

6.1	Summary and Conclusions.....	175
-----	------------------------------	-----

6.2	Future Work.....	176
-----	------------------	-----

6.2.1	Opportunities for Technological Improvements	176
-------	--	-----

6.2.2	Opportunities for Understanding and Improving the User Experience	177
-------	---	-----

6.2.3	Opportunities for Deepening our Understanding of Availability	178
-------	---	-----

References	179
-------------------	------------

Appendix A — List of Abbreviations	223
---	------------

Appendix B — Examples of Sensor Values	225
---	------------

Appendix C — SensBatch-XML Schema	228
--	------------

Appendix D — ESMconfig-XML Schema	229
--	------------