
Contents

I	Introduction and Objectives	3
1	Introduction	5
1.1	Motivation	7
1.2	Objectives	10
1.3	Structure of the Thesis	12
1.4	Publications List	12
1.5	Research Projects	15
1.6	Research Visits	16
1.7	Funding	16
II	Selected Papers	17
2	The JaCallive framework for MAS in IVE: a case study in evolving modular robotics	19
2.1	Introduction	21
2.2	Related work	23
2.2.1	IVE	24
2.2.2	Multi-Agent Systems	25
2.2.3	MAM5	26
2.3	JaCallIVE	27
2.4	Case Study: Evolving modular robotics	31
2.4.1	Description	31

2.4.2	Developed System	33
2.4.3	Execution tests and results	35
2.5	Conclusions	38
2.6	Acknowledgements	39
3	Extending MAM5 Meta-Model and <i>JaCalIVE</i> Framework to Integrate Smart Devices from Real Environments	41
3.1	Abstract	43
3.2	Introduction	43
3.2.1	Intelligent Virtual Environment (IVE)	45
3.2.2	Multi-Agent systems	46
3.2.3	MAM5	48
3.2.4	JaCalIVE (Jason Cartago implemented intelligent virtual environment)	50
3.2.5	Accessing the Environment	52
3.2.6	Smart resources	53
3.3	Methods	54
3.3.1	Modified MAM5	55
3.3.2	JaCalIVE Modified	57
3.4	Results	63
3.4.1	System design	64
3.4.2	Implementation	68
3.4.3	Execution tests	70
4	Influencing over People with a Social Emotional Model	77
4.1	Abstract	79
4.2	Introduction	79
4.3	Previous approaches	82
4.3.1	Ortony, Clore & Collins: OCC	82
4.3.2	PAD Model	82
4.4	Social Emotional Model Based on the PAD model	84
4.5	Case Study	91
4.5.1	Analysis of possible scenarios	92
4.5.2	Improving by learning of the DJ agent	95
4.6	Conclusions and future work	100
4.7	Acknowledgements	102

5	Developing an Emotional-based Application for Human-Agent Societies	103
5.1	Abstract	105
5.2	Introduction	105
5.3	Related Work	107
5.4	Problem description	111
5.5	Application Design	113
5.6	Implementation	115
	5.6.1 DJ Agent	115
	5.6.2 Human-Immersed Agent	117
5.7	Conclusions and future work	128
5.8	Compliance with Ethical Standards	129
6	Introducing Dynamism in Emotional Agent Societies	131
6.1	Abstract	133
6.2	Introduction	133
6.3	Related Work	135
	6.3.1 Robotics Application	137
6.4	Dynamic Emotional Model	138
	6.4.1 Social Emotional Model	141
6.5	Validation tests	145
	6.5.1 First Experiment	146
	6.5.2 Second Experiment	148
	6.5.3 Third Experiment	149
6.6	A robot guided by emotions.	150
	6.6.1 Emotion identification	152
	6.6.2 Emotion dynamics experimentation	156
6.7	Conclusions and future work	162
6.8	Acknowledgements	163
III	Discussion	165
7	General Discussion of the Results	167
7.1	JaCalIVE framework	169
7.2	Social emotional model	170
7.3	Dynamic emotional model	171
7.4	Emotional Intelligent Virtual Environments	172

IV Conclusion	173
8 Conclusions and future work	175
8.1 Contributions	177
8.2 Future Work	179
Bibliography	183