Contents

Pr	eface	he edito		xv xix xxiii
1	Cipi	rian Do	on to enhanced living environments bre, Ivan Ganchev, Nuno M. Garcia, Rossitza Goleva Alberto Valderrama	1
		tract		1
	1.1		luction	1
	1.2		verview of healthcare systems	3
	1.3		ent assisted living and enhanced living environments	7
		Concl		14
			gements	16
		erences graphies		16 18
	Dio	grapines	,	10
2	Enh	anced	living environments from the viewpoint	
	of s	ocioeco	ological psychology tos and Viola Sallay	21
	Abs	tract		21
	2.1	Introd	luction	21
	2.2	Socio	ecological psychology as a framework	22
	2.3		ept of 'human niche construction' as a universal human	
		pheno	menon	22
	2.4		as a niche	24
		2.4.1	Emotional processes in the home: lessons learnt with	
			the Emotional Map of the Home Interview	25
	2.5		y of Self-determination theory	28
			Core concepts of SDT	28
	2.6		g it all together: socioecological psychological aspects	20
		of EL		30
			ELE as niche construction	31
		2.6.2	ELE and home niches: the potential places of technology	34
		262	in a complex system	34
		2.6.3	Constructing ELE solutions in home niches: the importance	36
			of psychological need support	30

	T 1 1	1		-	11.	. 1	
V111	Huhancod	Imma	environments:	trom	models to	technol	OCHOC
VIII	Limancea	uvuu	environnienis.	II OIII	mouels ic	, iechnioi	UZICS

	2.7	40		
	Ack	41		
	Refe	41		
	Furt	her reading	46	
	Biog	47		
3	Per	vasive sensing for social connectedness	49	
	Kaa	lian Davis, Evans B. Owusu, Lucio Marcenaro, Jun Hu,		
	Car	lo S. Regazzoni, and Loe Feijs		
	Abs	tract	49	
	3.1	Introduction	49	
		3.1.1 Social isolation and loneliness as risk factors	50	
		3.1.2 Ambient assisted living	50	
	3.2	A user-centred approach for designing systems to support		
		social connectedness	52	
		3.2.1 A user-centred design process	53	
	3.3		55	
	3.4	Pervasive sensing and models for HAR	57	
	3.5		60	
	3.6	Context-aware connectedness systems	62	
	3.7	Experimental results	65	
		3.7.1 Perceptions on context-aware solutions for social		
		connectedness	65	
		3.7.2 HAR-based activity displays for social connectedness	66	
	3.8	Challenges	69	
	3.9	Conclusion	69	
	Ack	nowledgements	70	
	Refe	erences	70	
	Furt	her reading	77	
	Data	a set	77	
	Biog	graphies	77	
4	E4h	iss in information and communication technologies		
4		ics in information and communication technologies: ning the elderly in making gerontechnology accessible	81	
		ene Geurts, Marie-Claire Haelewyck, and Carlos Valderrama	01	
	Abs	tract	81	
	4.1	Introduction	81	
	4.2	Generation effect	82	
	4.3	Gerontechnology is a neologism vector of the future	83	
	4.4	Pitfalls to be avoided	85	
	4.5	Ethical issues at stake	88	
	4.6	Identification of needs, the keystone of reflection	90	
	4.7	Need for acceptability, the secret of success	93	
	4.8	Conclusion	95	
		nowledgements	95	

				Contents	ix
	Refe	erences			95
		her reac	ling		98
		graphies	•		99
	2108	Stupines	,		
5	End	l-users'	AAL and ELE service scenarios in smart personal	onal	
		ironme			101
	_	-	xier, Rossitza Goleva, Nuno M. Garcia, Rumen Sta		
			nev, Constandinos X. Mavromoustakis, Ciprian Do	obre,	
	Ivan	ı Chorb	ev, Vladimir Trajkovik, and Eftim Zdravevski		
		tract			101
		Introd			102
			of the art		103
		_	g lab architecture		106
	5.4		ser groups	_	108
	5.5		single user and single sensor to the cloud and back	k	110
	5.6				114
			mized ELE ICT services		120
			usions and further research directions		122
		nowled erences	gements		122
			lina		122 128
		her reac graphies	_		128
	Diog	grapines	5		120
6	Tec	hnologi	ical support to stress-level monitoring		133
	Vale	entina N	Markova and Todor Ganchev		
	Abs	tract			133
		Introd	uction		133
	6.2	State-	of-the-art personal health monitoring systems		135
		6.2.1			135
		6.2.2	Overview of system architectures		139
		6.2.3	Short-range wireless network technology		141
	6.3	Stress	and emotion assessment		145
		6.3.1	Stress assessment procedure		146
			Emotion recognition		147
	6.4	Use ca	ases		148
		6.4.1	* *		148
		6.4.2	1		149
			Recent projects		151
		6.4.4	Tr .		152
	6.5		e technology in support of stress monitoring		
	ъ.		anagement		153
		erences			155
		her reac	e .		158
			reviations		159
	Biog	graphies	3		160

7	_		ealthcare system to improve healthcare information	1.61			
		_	in the Internet vova Evtimova	161			
	wari	ya sav	ova Evilmova				
	Abstract						
	7.1 Introduction						
	7.2 Intelligent agents' advantages and characteristics						
		-	logic and probability	163			
	7.4		ing of big data in a personalized search of uncertain				
			ague information	165			
			Value and demand in-depth analysis	165			
			Variety and heterogeneity of data	165			
			Quality of data	166			
			Volume and size of data	166			
			Speed and timeliness of the data	166			
	7.5		based and case-based reasoning	166			
	7.6		ed work	167			
	7.7	_	a-based system for personalized searching	167			
		7.7.1	1 2	168			
		1.1.2	Conceptual model for personalized semantic search				
			system when the information in the query is fuzzy and uncertain	168			
	7.8	Conce	ept of building a customized profile	172			
	7.0	7.8.1		1/2			
		7.0.1	information	172			
		7 8 2	Conceptual scheme of the user profile	173			
	7.9		opment of applied subjective ontology: problems and	1/3			
	1.)	approa		174			
		7.9.1	Storing the knowledge in the fuzzy ontology of the	1/7			
		7.7.1	proposed semantic system	174			
		7.9.2	Fuzzification process in case-based ontology	174			
			Design of the fuzzy and vague case-based ontology	174			
	7.10		iption of the process of reasoning	175			
			es for evaluating the quality of the returned results				
			the search system	178			
	7.12	Concl	· · · · · · · · · · · · · · · · · · ·	178			
	Refe	rences		180			
	Furth	ner read	ding	182			
	List of abbreviations						
	Biog	raphy		182			
8			r wireless body area networks	183			
			olaeva Ruskova and Elitsa Emilova Gieva	4.05			
	Ahst	ract		183			

		Contents	xi
	8.1	Introduction: wireless body area networks and wireless	
		sensor network	183
	8.2	Sensor node	184
	8.3	Overview of sensor characteristics	192
	8.4	WBAN technologies	199
		8.4.1 Applications depending on the technology	200
	8.5	Conclusion	202
		rences	202
		ner reading	204
	Biog	raphies	204
9	AAI	LaaS/ELEaaS platforms	207
		itza Goleva, Mara Pudane, Sintija Petrovica, Egons Lavendelis,	
	Karl	Kreiner, Mario Drobics, Ivan Ganchev, Nuno M. Garcia,	
	Rum	en Stainov, Ciprian Dobre, Constandinos X. Mavromoustakis,	
	Ivan	Chorbev, Vladimir Trajkovik, Eftim Zdravevski,	
	and	George Mastorakis	
	Abst	ract	207
	9.1	Introduction	208
	9.2	State of the art	209
	9.3	Generic AALaaS/ELEaaS architecture	210
	9.4	Affective computing mapping implementation	216
	9.5	KIOLA platform implementation	220
	9.6	AAL/ELE laboratory and home implementation	223
	9.7	Conclusion and further research plan	224
	Ackı	nowledgements	224
		rences	224
		ner reading	229
	Biog	raphies	229
10	Line	ar wireless sensor networks and protocols	
	in th	ne next-generation networks	235
	Rade	osveta I. Sokullu and Eren Demir	
	Abst		235
		Introduction	236
	10.2	Linear wireless sensor networks	237
		10.2.1 Network model	237
		10.2.2 Variations of LWSNs	238
	16.5	10.2.3 Objectives and challenges of LWSNs	240
	10.3	MAC protocols for LWSNs	241
	10.4	Open research issues	262
	10.5	Conclusion	262
	Refe	rences	263

• •	T 1 1	1		C	1 1	1	1 .
X11	Enhanced	living	environments:	trom	models i	to technol	noies
7111	Divitorio	vi vi vi	City ti Oitilitelitis.	,, 0,,,	model i	o iccinio	CSICS

xii	En	hanced living environments: from models to technologies				
		er reading	266			
	List of abbreviations					
	Gloss	•	267			
	Biogr	raphies	268			
11	Belga	el-compilation challenges for cyber-physical systems acem Ben Hedia, Chokri Mraidha, Etienne Hamelin, Gara Tucci-Piergiovanni	269			
		ě	260			
	Abstr		269			
		Introduction CDS abellemose	269			
		CPS challenges	272			
	11.3	1 23 11	275			
		11.3.1 Front-end: from multiple heterogeneous	27.5			
		high-level models	275			
		11.3.2 Middle-end: model-compilation into SwArch	280			
		11.3.3 Back-end: transformation into concrete target				
		platforms	283			
		11.3.4 Design iterations	283			
	11.4	Model-compilation methodology assessment	284			
		11.4.1 Applicability of model-compilation approach	284			
		11.4.2 Productivity enhancements	285			
	11.5	Related works	285			
		11.5.1 Model-based methodologies for safety				
		and timing	285			
		11.5.2 Model-compilation	286			
		11.5.3 Physical modelling	287			
	11.6	Conclusion	288			
	Refer	ences	288			
	Biogr	raphies	291			
12	Healt	th monitoring using WBAN: topology design, routing				
		thermal issues	293			
		ran Ahmed, Saif Ul Islam, Maham Shahid, Azfar Shakeel,	2,0			
		un Nisa, Najmul Hassan, Numera M.I. Shahid,				
		er Ul Hussain Sani, and Hilal Jan				
	Abstr	act	293			
	12.1	Introduction	293			
		12.1.1 Applications	295			
		12.1.2 WBAN wireless technologies	298			
		12.1.3 WBAN infrastructure	300			
		12.1.4 Energy efficiency	300			
		12.1.5 Approaches to achieve energy efficiency	300			
	12.2	Energy-aware topology design	300			
	14,4	12.2.1 Optimization of relay nodes placement	301			
		12.2.1 Optimization of relay flodes placement	304			

			Contents	xiii
	12.3	SAR aı	nalysis	304
		12.3.1	Using low transmission power level to	
			reduce SAR	305
			Impact of frequency band on SAR values	305
			Impact of high SAR on human body	305
	12.4		efficient and SAR-aware routing	306
			Energy-efficient routing	306
			SAR-aware routing	308
		Conclu	sion	309
		ences		309
	Biogr	aphies		313
13			alth care: technology evolution, algorithms	
	and r			315
			a Aileni, Sever Pasca, Carlos Alberto Valderrama, trungaru	
	Abstr	act		315
	13.1	Introdu	action	315
	13.2	Wearal	ole technology evolution	316
			care perspectives for wearable devices	324
	13.4	Algorit	thms dedicated to wearable technologies	325
		13.4.1	Case 1: wearable sensors for body temperature	
			monitoring	326
		13.4.2		
			conductance response	331
		13.4.3		222
	10.5	XX 7 1	monitoring	332
			ble: user needs and expectations	334
		Conclu	wearable challenges	335
				337 338
		owledge ences	ments	338
		aphies		342
	Diogi	apines		342
14			stem for after-stroke home rehabilitation	345
			escu, Marian-Silviu Poboroniuc, Decebal Popescu, and Alexandru Valer Grigoraş	
			ana menana rater Grigoraş	2.45
	Abstr		att.	345
	14.1	Introdu		345
	14.2		and development of the IHRG structure	348 349
	14.3		control approach	
		14.3.1	Hardware and software design	349
	14.4	14.3.2 Prodefi	Experiments with vocal commands	352 353
	14.4	riedell	ned recovery exercises system for home use	333

xiv	Enhanced	living	environmer	nts: from	models to	technologies	
		LEEG					

Biog	raphies	366	
	rences	365	
14.6	14.5.3 Conclu	Statistical analysis	360 364
		Experimental results	358
	14.5.1	Hybrid system description	354
14.5	Hybrid	354	