

References

- Abuczki A (2014) On the disambiguation of multifunctional discourse markers in multimodal interaction. *J Multimodal User Interfaces* 8(2):121–134
- Adams R, Hannaford B (1999) Stable haptic interaction with virtual environments. *IEEE Trans Robot Autom* 15(3):465–474
- Ainsworth MDS, Bell SM (1970) Attachment, exploration, and separation: illustrated by the behavior of one-year-olds in a strange situation. *Child Dev* 41:49–67
- AIST RTM (2010) AIST, OpenRTM-aist. <http://www.openrtm.org>
- Almasi B (2013) Multipath communication: a new basis for the future Internet cognitive infocommunication. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 201–204
- Alpcan T, Bauckhage C, Kotsovinos E (2007) Towards 3D Internet: why, what, and how? In: International conference on cyberworlds, 2007 (CW'07), pp 95–99
- Alpcan T, Buttyan L, Baras JS (2010) Decision and game theory for security. *Lecture notes in computer science*, vol 6442. Springer, Berlin
- Alvarez F et al (eds) (2012) The future internet - from promises to reality. In: Future Internet assembly, Aalborg. Springer, Heidelberg
- Ambady N, Rosenthal R (1992) Thin slices of expressive behavior as predictors of interpersonal consequences: a meta-analysis. *Psychol Bull* 111(2):256
- Ando N, Suehiro T, Kitagaki K, Kotoku T, Yoon WK (2005) RT-middleware: distributed component middleware for RT (robot technology). In: 2005 IEEE/RSJ international conference on intelligent robots and systems, 2005 (IROS 2005). IEEE, pp 3933–3938
- Arend M (2002) SEAMATE: socio-economic analysis and macro-modeling of adapting to information technology in Europe. Technical Report IST-2000-31104, Information Society Technologies
- Arnold V (1957) On functions of three variables. *Dokl Akad Nauk USSR* 114:679–681
- Aryania A, Daniel B, Thomassen T, Sziebig G (2012) New trends in industrial robot controller user interfaces. In: 3rd IEEE international conference on cognitive infocommunications, Kosice, pp 365–369
- Auvray M, Myin E (2009) Perception with compensatory devices: from sensory substitution to sensorimotor extension. *Cognit Sci* 33:1036–1058
- Bach-y Rita P, Tyler M, Kaczmarek K (2003) Seeing with the brain. *Int J Hum Comput Interact* 15(2):285–295
- Baják S, Páles Z (2009) Computer aided solution of the invariance equation for two-variable Gini means. *Comput Math Appl* 58:334–340. doi:10.1016/j.camwa.2009.03.107

- Bakonyi P, Sallai G (2014a) Future Internet National Research Program - JINKA 2.4 (in Hungarian), Budapest, p 60
- Bakonyi P, Sallai G (eds) (2014b) Future Internet research in Hungary - FIRCC Report 2014, Debrecen, p 128. ISBN: 978-963-473-718-6
- Balata J, Franc J, Mikovec Z, Slavik P (2014) Collaborative navigation of visually impaired. *J Multimodal User Interfaces* 8:175–185
- Baranyi P (2004) TP model transformation as a way to LMI based controller design. *IEEE Trans Ind Electron* 51(2):387–400
- Baranyi P (2014) The generalized TP model transformation for TS fuzzy model manipulation and generalized stability verification. *IEEE Trans Fuzzy Syst* 22(4):934–948. ISSN: 1063-6706
- Baranyi P, Csapo A (2010) Cognitive infocommunications: CogInfoCom. In: 2010 11th international symposium on computational intelligence and informatics (CINTI), Budapest, pp 141–146
- Baranyi P, Csapo A (2012) Definition and synergies of cognitive infocommunications. *Acta Polytech Hung* 9:67–83
- Baranyi P, Gilanyi A (2013) Mathability: emulating and enhancing human mathematical capabilities. In: 2013 IEEE 4th international conference on cognitive infocommunications (CogInfoCom). IEEE, pp 555–558
- Baranyi P, Yam Y, Varlaki P (2006) Tensor product model transformation in polytopic model-based control. CRC/Taylor & Francis, Boca Raton/London
- Baranyi P, Galambos P, Csapo A, Varlaki P (2012) Stabilization and synchronization of dynamicons through CogInfoCom channels. In: 2012 IEEE 3rd international conference on cognitive infocommunications (CogInfoCom), pp 33–36
- Baranyi P, Csapo A, Varlaki P (2014) An overview of research trends in CogInfoCom. In: 2014 18th international conference on intelligent engineering systems (INES). IEEE, pp 181–186
- Barrass S (1998) Auditory information design. Ph.D. thesis, Australian National University
- Benford S, Bowers J, Fahlen LE, Greenhalgh C, Snowdon D (1997) Embodiments, avatars, clones and agents for multi-user, multi-sensory virtual worlds. *Multimedia Systems* 5(2):93–104
- Benus S (2013) Cognitive aspects of communicating information with conversational fillers in slovak. In: 4th IEEE international conference on cognitive infocommunications. IEEE, pp 271–276
- Benus S, Levitan R, Hirschberg J (2012) Entrainment in spontaneous speech: the case of filled pauses in supreme court hearings. In: 3rd IEEE international conference on cognitive infocommunications, pp 793–797
- Benus S, Gravano A, Levitan R, Levitan SI, Willson L, Hirschberg J (2014a) Entrainment, dominance and alliance in supreme court hearings. *Knowl-Based Syst*. doi:10.1016/j.knosys.2014.05.020
- Benus S, Levitan R, Hirschberg J, Gravano A, Darjaa S (2014b) Entrainment in slovak collaborative dialogues. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 309–313
- Berthelon F, Sander P (2013a) Emotion ontology for context awareness. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 59–64
- Berthelon F, Sander P (2013b) Regression algorithm for emotion detection. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 91–96
- Berthoz A, Pavard B, Young LR (1975) Perception of linear horizontal self-motion induced by peripheral vision (linearvection) basic characteristics and visual-vestibular interactions. *Exp Brain Res* 23(5):471–489
- Betaille D, Toledo-Moreo R (2010) Creating enhanced maps for lane-level vehicle navigation. *IEEE Trans Intell Transp Syst* 11(4):786–798
- Bhatt GD (2001) Knowledge management in organizations: examining the interaction between technologies, techniques, and people. *J Knowl Manag* 5(1):68–75
- Biocca F, Kim J, Choi Y (2001) Visual touch in virtual environments: an exploratory study of presence, multimodal interfaces and cross-modal sensory illusions. *Presence Teleoperators Virtual Environ* 10(3):247–265

- Biocca F, Inoue Y, Polinsky H, Lee A, Tang A (2002) Visual cues and virtual touch: role of visual stimuli and intersensory integration in cross-modal haptic illusions and the sense of presence. In: Gouveia F (ed) *Proceedings of presence*, Porto
- Biro J, Heszberger Z, Martinecz M, Kis SM (2010) Novel equivalent capacity approximation through asymptotic loss analysis. *Comput Commun* 33(1):S152–S156
- Blake R (2000) Computer mediated communication: a window on L2 Spanish interlanguage. *Lang Learn Technol* 4(1):120–136
- Blattner M, Sumikawa D, Greenberg R (1989) Earcons and icons: their structure and common design principles. *Hum Comput Interact* 4(1):11–44
- Blattner MM, Papp A, Glinert E (1994) Sonic enhancement of two-dimensional graphics displays. In: Kramer G (ed) *Auditory display: sonification, audification and auditory interfaces*. Addison Wesley, Reading, pp 447–470
- Blum JR, Eichhorn A, Smith S, Sterle-Contala M, Cooperstock JR (2014) Real-time emergency response: improved management of real-time information during crisis situations. *J Multimodal User Interfaces* 8:161–173
- Boiko B (2005) *Content management bible*. Wiley, Indianapolis
- Bonin F, Campbell N, Vogel C (2014a) Time for laughter. *Knowl-Based Syst* 71:15–24
- Bonin F, Vogel C, Campbell K (2014b) Social sequence analysis: temporal sequences in interactional conversations. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 403–406
- Borus G, Gilanyi A (2013) Solving systems of linear functional equations with computer. In: 4th IEEE international conference on cognitive infocommunications (CogInfoCom), pp 559–562
- Brewster S, Brown L (2004) Tactons: structured tactile messages for non-visual information display. In: *Proceedings of the 5th conference on Australasian user interface (AUIC'04)*, vol 28. Dunedin, pp 15–23
- Brunger-Koch M, Briest S, Vollrath M (2006) Virtual driving with different motion characteristics: braking manoeuvre analysis and validation. In: *Proceedings of the driving simulation conference*, pp 69–78
- Campbell N (2012) Social aspects and speechability in CogInfoCom systems. In: 3rd IEEE international conference on cognitive infocommunications, Kosice
- Carazo P, Font E (2010) Putting information back into biological communication. *J Evol Biol* 23(4):661–669
- Card SK, Moran TP, Newell A (1983) *The psychology of human-computer interaction*. Lawrence Erlbaum Associates, Hillsdale, NJ, USA
- Cassell J, Bickmore T, Billinghurst M, Campbell L, Chang K, Vilhjalmsson H, Yan H (1999) Embodiment in conversational interfaces: REA. In: *Proceedings of the SIGCHI conference on human factors in computing systems*, pp 520–527
- Castro J (1995) Fuzzy logic controllers are universal approximators. *IEEE Trans Syst Man Cybern* 25:629–635
- Castrucci M, Priscoli FD, Pietrabissa A, Suraci V (2011) *A cognitive future Internet architecture*. Springer, Berlin
- Cerf VG (2009) The day the Internet age began. *Nature* 461(7268):1202–1203
- Chaffee SH, Metzger MJ (2001) The end of mass communication? *Mass Commun Soc* 4(4):365–379
- Chen M, Gonzalez S, Vasilakos A, Cao H, Leung V (2011) Body area networks: a survey. *Mobile Netw Appl* 16(2):171–193
- Cheng DS, Salamin H, Salvagnini P, Cristani M, Vinciarelli A, Murino V (2014) Predicting online lecture ratings based on gesturing and vocal behavior. *J Multimodal User Interfaces* 8(2):151–160
- Chernoff H (1973) The use of faces to represent points in k-dimensional space graphically. *J Am Stat Assoc* 68(342):361–368
- ChuDuc H, NguyenPhan K, NguyenViet D (2013) A review of heart rate variability and its applications. *APCBEE Procedia* 7:80–85
- CloudNet 2014 (2014) *Third IEEE international conference on cloud networking*

- CogInfoCom (2010) First international workshop on cognitive infocommunications
- CogInfoCom (2011) Second international conference on cognitive infocommunications
- CogInfoCom (2012) Third IEEE international conference on cognitive infocommunications
- CogInfoCom (2013) Fourth IEEE international conference on cognitive infocommunications
- CogInfoCom (2014) Fifth IEEE international conference on cognitive infocommunications
- Csapo A (2014) Outlines of a framework for progressive representation-bridging coginfocom channels. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 321–326
- Csapo A, Baranyi P (2010) An interaction-based model for auditory substitution of tactile percepts. In: 14th IEEE international conference on intelligent engineering systems (INES), Gran Canaria, pp 271–276
- Csapo A, Baranyi P (2011) Perceptual interpolation and open-ended exploration of auditory icons and earcons. In: 17th international conference on auditory display, international community for auditory display, Budapest
- Csapo A, Baranyi P (2012a) A conceptual framework for the design of audio based cognitive infocommunication channels. In: Recent advances in intelligent engineering systems. Studies in computational intelligence, vol 368. Springer, Berlin/Heidelberg, pp 261–281. doi:[10.1007/978-3-642-23229-9_12](https://doi.org/10.1007/978-3-642-23229-9_12)
- Csapo A, Baranyi P (2012b) CogInfoCom channels and related definitions revisited. In: 2012 IEEE 10th jubilee international symposium on intelligent systems and informatics (SISY). Subotica, pp 73–78
- Csapo A, Baranyi P (2012c) The spiral discovery method: an interpretable tuning model for CogInfoCom channels. *J Adv Comput Intell Intell Inform* 16(2):358–367
- Csapo A, Baranyi P (2012d) A unified terminology for the structure and semantics of CogInfoCom channels. *Acta Polytech Hung* 9(1):85–105
- Csapo A, Baranyi P (2013) The evolving nature of human-device communication: lessons learned from an example use-case scenario. *Infocommun J* 5(4):27–32
- Csapo A, Wersenyi G (2014) Overview of auditory representations in human-machine interfaces. *ACM Comput Surv* 46(2):1–23
- Csapo A, Israel JH, Belaifa O (2013) Oversketching and associated audio-based feedback channels for a virtual sketching application. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 509–513
- Cybenko G (1989) Approximation by superposition of sigmoidal functions. *Math Control Signals Syst* 2:303–314
- Czirbusz S (2012) Testing regularity of functional equations with computer. *Aequationes Math* 84(3):271–283. doi:[10.1007/s00010-012-0157-7](https://doi.org/10.1007/s00010-012-0157-7)
- Dahlbom B (1996) The new informatics. *Scand J Inf Syst* 8(2):3
- Danyadi Z, Foldesi P, Koczy L (2012) Fuzzy search space for correction of cognitive biases in constructing mathematical models. In: 3rd IEEE international conference on cognitive infocommunications, Kosice, pp 585–589
- Daras P, Alvarez F (2009) A future perspective on the 3D media Internet. In: Tselentis G et al (eds) Towards the future Internet - a European research perspective. IOS Press, Amsterdam, pp 303–312
- De Groot S, De Winter JCF, Mulder M, Wieringa PA (2011) Nonvestibular motion cueing in a fixed-base driving simulator: effects on driver braking and cornering performance. *Presence Teleoperators Virtual Environ* 20(2):117–142
- de Meer H, Hummel KA, Basmadjian R (2012) Future Internet services and architectures: trends and visions. *Telecommun Syst (Special Issue)* 51(4):219–303
- De Vos M, Debener S (2014) Mobile EEG: towards brain activity monitoring during natural action and cognition. *Int J Psychophysiol* 91(1):1–2
- Deacon TW (2013) Incomplete nature: how mind emerged from matter. WW Norton & Company New York, NY, USA. ISBN: 978-0393343908
- Dobelle W (2000) Artificial vision for the blind by connecting a television camera to the visual cortex. *ASAIO J* 46(1):3–9

- Domingue J et al (eds) (2011) The Future Internet - achievements and technological promises. In: Future Internet assembly, Budapest. Springer, Heidelberg
- Dropoljic B, Popovic S, Petrinovic D, Cosic K (2013) Estimation of emotional states enhanced by a priori knowledge. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 481–486
- Drouin M, Kaiser DH, Miller DA (2012) Phantom vibrations among undergraduates: prevalence and associated psychological characteristics. *Comput Hum Behav* 28(4):1490–1496
- Duval T, Nguyen TTH, Fleury C, Chauffaut A, Dumont G, Gouranton V (2014) Improving awareness for 3D virtual collaboration by embedding the features of users' physical environments and by augmenting interaction tools with cognitive feedback tools. *J Multimodal User Interfaces* 8(2):187–197
- ECFI (2014) First European conference on future Internet, Brussels, 2-4 April 2014. Future Internet PPP. www.ecfi.eu/brussels2014
- Eichhorn W (1978) Functional equations in economics. Addison-Wesley, Reading
- EITO (2014) European information technology observatory. ICT Market Report, Yearbooks from 2001 to 2014. ISSN: 097-4862
- Ekman P (2003) Darwin, deception, and facial expression. *Ann N Y Acad Sci* 1000(1):205–221
- Ellis S (1991) Nature and origins of virtual environments: a bibliographical essay. *Comput Syst Eng* 2(4):321–347
- Endsley M, Garland D (2000) Situation awareness: analysis and measurement. Routledge, New York
- Enriquez M, MacLean K (2003) The hapticon editor: a tool in support of haptic communication research. In: Proceedings of the 11th symposium on haptic interfaces for virtual environment and teleoperator systems (HAPTICS'03). IEEE Computer Society, Los Angeles, pp 356–362
- Enriquez M, Maclean K, Chita C (2006) Haptic phonemes: basic building blocks of haptic communication. In: Proceedings of the 8th international conference on multimodal interfaces (ICMI 2006). ACM Press, Banff, pp 302–309
- Ericson A, Johansson C, Nergard H (2014) Manufacturing knowledge: going from production of things to designing value in use. *Intell Decis Technol* 9(1):79–89
- ETSI (2011) About ETSI, 2011. European Telecommunications Standards Institute, Sophia-Antipolis. <http://www.etsi.org/website/aboutetsi/aboutetsi.aspx>
- European Commission (1997) Green paper on the convergence of the telecommunications, media and information technology sectors, and implications for regulation. Towards an Information Society Approach, COM, 3 December 1997
- European Commission (2010) Future media networks - research challenges 2010. Future media networks cluster of networked media systems FP7 projects. doi:10.2759/37178
- European Commission (2013a) HORIZON 2020 - The Framework Programme for Research and Innovation. Work Programme (2014-2020) 5.i. Leadership in enabling and industrial technologies: Information and communication technologies. Annex 6 to Decision, December 2013, p 107
- European Commission (2013b) International conference on Internet science. The FP7 European Network of Excellence in Internet Science, Brussels, 9-11 April 2013. <http://internet-science.eu>
- Farago T, Konok V, Gacsi M (2011) Humans are able to recognize emotions by behavioural expressions of an abstract artificial agent. In: 2nd international conference on cognitive infocommunications
- Fekete K, Csorba K (2014) Power extraction of human behavior in mobile environment. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 481–486
- Fenn J, Raskino M (2008) Mastering the hype cycle: how to choose the right innovation at the right time. Harvard Business Press Review, Boston
- Fischer A, Beck MT, De Meer H (2013) An approach to energy-efficient virtual network embeddings. In: 2013 IFIP/IEEE international symposium on integrated network management (IM 2013), pp 1142–1147

- Flanagan JR, Vetter P, Johansson RS, Wolpert DM (2003) Prediction precedes control in motor learning. *Curr Biol* 13(2):146–150
- Flanagan JR, Bowman MC, Johansson RS (2006) Control strategies in object manipulation tasks. *Curr Opin Neurobiol* 16(6):650–659
- Foldesi P, Botzheim J (2012) Computational method for corrective mechanism of cognitive decision-making biases. In: 2012 IEEE 3rd international conference on cognitive infocommunications (CogInfoCom), pp 211–215
- Fortuna C, Mohorcic M (2009) Trends in the development of communication networks: cognitive networks. *Comput Netw* 53(9):1354–1376
- Fransman M (2002) Mapping the evolving telecoms industry: the uses and shortcomings of the layer model. *Telecommun Policy* 26(9):473–483
- Freeman C (1994) The diffusion of information and communication technology in the world economy in the 1990s. In: *The management of information and communication technologies: emerging patterns of control*. Aslib, London, pp 8–41
- Fuchs S, Hale K, Axellson P (2007) Augmented cognition can increase human performance in the control room. In: 2007 IEEE 8th human factors and power plants and HPRCT 13th annual meeting, Monterey, pp 128–132
- FutureRFID (2014) First international conference on future RFID technologies, Eger, 6-7 November 2014. www.futurerfid.ektf.hu
- Gal Z, Almási B, Daboczi T, Vida R, Oniga S, Baran S, Farkas I (2014) Internet of things: application areas and research results of the FIRST project. *Infocommun J* 6(3):37–44
- Galambos P (2012) Vibrotactile feedback for haptics and telemanipulation: survey, concept and experiment. *Acta Polytech Hung* 9(1):41–65
- Galambos P, Baranyi P (2011a) Vibrotactile force feedback for telemanipulation: concept and applications. In: 2011 2nd international conference on cognitive infocommunications (CogInfoCom). IEEE, Budapest, pp 1–6
- Galambos P, Baranyi P (2011b) VirCA as virtual intelligent space for RT-middleware. In: 2011 IEEE/ASME international conference on advanced intelligent mechatronics (AIM), Budapest, pp 140–145. doi:10.1109/AIM.2011.6027133
- Galambos P, Weidig C, Baranyi P, Aurich JC, Hammann B, Kreylos O (2012a) VirCA NET: a case study for collaboration in shared virtual space. In: 3rd IEEE international conference on cognitive infocommunications. IEEE, Kosice, pp 273–277
- Galambos P, Weidig C, Zentay P, Csapo d, Baranyi P, Aurich JC, Hammann B, Kreylos O (2012b) VirCA NET: a collaborative use case scenario on factory layout planning. In: 3rd IEEE international conference on cognitive infocommunications. IEEE, Kosice, pp 467–468
- Galambos P, Csapo d, Zentay P, Fulop IM, Haidegger T, Baranyi P, Rudas IJ (2015) Design, programming and orchestration of heterogeneous manufacturing systems through VR-powered remote collaboration. *Robot Comput Integr Manuf* 33:68–77
- Galanis D, Karabetsos S, Koutsombogera M, Papageorgiou H, Esposito A, Riviello MT (2013) Classification of emotional speech units in call centre interactions. In: 4th IEEE international conference on cognitive infocommunications, pp 403–406
- Galis A, Gavras A (eds) (2013) *The future Internet – validated results and new horizons*. In: *Future Internet assembly*. Dublin. Springer, Heidelberg
- Galis A, Denazis S et al. (eds) (2004) *Programmable networks for IP service deployment*. Artech House Books, Norwood
- Ganter B, Wille R (1999) *Formal concept analysis*. Springer, Berlin
- Garriott R (1985) *Ultima IV: quest of the avatar*. Origin Systems US Copyright Office PA–317–504
- Gartner Inc. (2014) *Lead and Transform Your enterprise into the Digital Age*, presented by L. Weldon, Budapest
- Garzo A, Benczur AA, Sidlo CI, Tahara D, Wyatt EF (2013) Real-time streaming mobility analytics. In: 2013 IEEE international conference on big data, pp 697–702
- Gaver W (1986) Auditory icons: using sound in computer interfaces. *Hum Comput Interact* Elsevier Science, Amsterdam 2(2):167–177

- Gaver W (1988) Everyday listening and auditory icons. Ph.D. thesis, University of California, San Diego
- Gaver W (1989) The SonicFinder: an interface that uses auditory icons. *Hum Comput Interact* 4(1):67–94
- Gaver W (1997) Auditory interfaces. In: Helander HG, Landauer TK, Prabhu P (eds) *Handbook of human-computer interaction*. Elsevier, Amsterdam
- Gazebo (2012) GAZEBO robot simulation environment. <http://www.gazebosim.org/>
- Gilányi A (1998) Solving linear functional equations with computer. *Math Pannonica* 9(1):57–70
- Giles J (2009) What is ICT? Michalsons. <http://www.michalsons.co.za/what-is-ict/2525>
- Gilovich T, Griffin D, Kahneman D (2002) Heuristics and biases: the psychology of intuitive judgement. Cambridge University Press, Cambridge
- Granstrom B, House D, Swerts M (2002) Multimodal feedback cues in human-machine interactions. In: *International conference on speech prosody 2002*
- Gray J (2000) The Hilbert problems 1990–2000. *Newsletter* 36:10–13
- Greitzer FL, Griffith D (2006) A human-information interaction perspective on augmented cognition. In: *Abstract submitted to augmented cognition international, CA[PNNL-SA-49657]*, San Francisco
- Griffith D, Greitzer FL (2007) Neo-symbiosis: the next stage in the evolution of human information interaction. *Int J Cogn Inform Nat Intell* 1(1):39–52
- Gripenberg P (2011) The walking video interview (WVI) as a potential technique to tap into the everyday experiences of ICTs. In: *Information systems research seminar in Scandinavia (IRIS)*, Turku, pp 139–155
- Gurkok H, Nijholt A (2012) Brain-computer interfaces for multimodal interaction: a survey and principles. *Int J Hum Comput Interact* 28(5):292–307
- Hale KS, Fuchs S, Berka C (2008) Driving EEG cognitive assessment using eye fixations. In: *2nd international conference on applied human factors and ergonomics, Las Vegas*
- Halpern JY (1990) An analysis of first-order logics of probability. *Artif Intell* 46(3):311–350
- Hangya V, Farkas R (2013) Target-oriented opinion mining from tweets. In: *4th IEEE international conference on cognitive infocommunications*, pp 251–254
- Hanson MA, Powell HC Jr, Barth AT, Ringgenberg K, Calhoun BH, Aylor JH, Lach J (2009) Body area sensor networks: challenges and opportunities. *Computer* 42(1):58–65
- Házy A (2004) Solving linear two variable functional equations with computer. *Aequationes Math* 67(1–2):47–62. doi:10.1007/s00010-003-2703-9
- Hearst MA (1997) Dissonance on audio interfaces. *IEEE Expert* 12(5):10–16
- Hecht D, Reiner M (2009) Sensory dominance in combinations of audio, visual and haptic stimuli. *Exp Brain Res* 193:307–314
- Heder M (2014) Emergence and tacit knowledge in machines. Ph.D. thesis. http://www.omikk.bme.hu/collections/phd/Gazdasag_es_Tarsadalomtudomanyi_Kar/2014/Heder_Mihaly/tezis_eng.pdf
- Hemingway CJ, Gough TG (1998) A socio-cognitive theory of information systems. *Research Report Series, University of Leeds, School of Computer Studies* (25):1–40
- Henten A, Samarajiva R, Melody W (2003) Designing next generation telecom regulation: ICT convergence or multi-sector utility? *Info* 5(1):26–33
- Hercegi K (2011a) Heart rate variability monitoring during human-computer interaction. *Acta Polytech Hung* 8(5):205–224
- Hercegi K (2011b) Improved temporal resolution heart rate variability monitoring-pilot results of non-laboratory experiments targeting future assessment of human-computer interaction. *Int J Occup Saf Ergon* 17(2):105–117
- Hermann T (2002) Sonification for exploratory data analysis. Ph.D. thesis, University of Bielefeld
- Hermann T (2008) Taxonomy and definitions for sonification and auditory display. In: *14th international conference on auditory display*, pp 1–8
- Hermann T, Ritter H (1999) Listen to your data: model-based sonification for data analysis. In: Lasker GE (ed) *Advances in intelligent computing and multimedia systems*. The International Institute for Advanced Studies in System Research and Cybernetics, Baden-Baden, pp 189–194

- Hermann T, Hunt A, Neuhoff J (2011) *The sonification handbook*. Logos Verlag, Berlin
- Hewes D (1995) *The cognitive bases of interpersonal communication*. Routledge, New York
- Hirata-Kohno N, Petho A (2013) On a key exchange protocol based on diophantine equations. *Infocommun J* 5(3):17–21
- Hochberg L, Donoghue J (2006) Sensors for brain-computer interfaces. *IEEE Eng Med Biol Mag* 25(5):32–38
- Hodder I (2012) *Entangled: An Archaeology of the Relationships between Humans and Things*. Blackwell Publishing Wiley-Blackwell, Chichester, UK. ISBN: 978-0470-67211-2
- Hodder I (2014) The entanglements of humans and things: a long-term view. *New Lit Hist* 45(1):19–36
- Hokanson B, Hooper S (2000) Computers as cognitive media: examining the potential of computers in education. *Comput Hum Behav* 16(5):537–552
- Hollan J, Hutchins E, Kirsh D (2000) Distributed cognition: toward a new foundation for human-computer interaction research. *ACM Trans Comput Hum Interact* 7(2):174–196
- Hunt A, Hermann T, Pauletto S (2004) Interacting with sonification systems: closing the loop. In: Banissi E, Börner K (eds) *IV'04: proceedings of the 8th international conference on information visualisation (IV'04)*. IEEE Computer Society, London, pp 879–884
- Hurley S, Noe A (2003) Neural plasticity and consciousness. *Biol Philos* 18:131–168
- IDC 2014 (2014) International data corporation: European Internet of things ecosystem and trends. http://www.idc.com/getdoc.jsp?containerId=IDC_P29863
- IDATE (2009) *DigiWorld Yearbook 2009*, Montpellier. ISBN:978-2-84822-143-4
- Ishteva M, Lathauwer L, Absil P, van Huffel S (2008) Dimensionality reduction for higher-order tensors: algorithms and applications. *Int J Pure Appl Math* 42(3):337–343
- ITU (1999) *Convergence and regulation. Volume of trends in telecommunication reform*. International Telecommunication Union, Geneva
- ITU (2009) *Measuring the information society: the ICT development index*. International Telecommunication Union, Geneva
- ITU (2011a) *ITU-T recommendation Y.3001: future network vision – objectives and design goals*. International Telecommunication Union, Geneva
- ITU (2011b) *ITU-T recommendation Y.3011: framework of network virtualization for future networks*. International Telecommunication Union, Geneva
- ITU (2012a) *ITU-T recommendation Y.3021: framework of energy saving for future networks*. International Telecommunication Union, Geneva
- ITU (2012b) *ITU-T recommendation Y.3031: identification framework in future networks*. International Telecommunication Union, Geneva
- Jamsa J, Sukuvaara T, Luimula M (2014) Vehicle in a cognitive network. *Intell Decis Technol* 9(1):17–27
- Jokinen K (2008) User interaction in mobile navigation applications. In: Meng L, Zipf A, Winter S (eds) *Map-based mobile services. Lecture Notes in geoinformation and cartography*. Springer, Berlin/Heidelberg, pp 168–197
- Joosten S (1994) Trigger modelling for workflow analysis. In: *Proceedings of CON'94: workflow management, challenges, paradigms and products*, pp 236–247
- Kahneman D (2011) *Thinking, fast and slow*. Farrar, Straus and Giroux, New York, NY, USA
- Kalmar A, Vida R, Maliosz M (2013) Context-aware addressing in the Internet of things using bloom filters. In: *4th IEEE international conference on cognitive infocommunications*, pp 487–492
- Kapahnke P, Liedtke P, Nesbigall S, Warwas S, Klusch M (2010) An open platform for semantic-based 3D simulations in the 3D Internet. *Lect Notes Comput Sci* 6497:161–176
- Karnouskos S, Skarmeta A (2013) *The future Internet of things. Introduction to chapter on Internet of things*. In: *FIA 2013*. Springer, Heidelberg, pp xxv–xxvii
- Kaye J (2004) Making scents: aromatic output for HCI. *Interactions* 11:48–61. doi:<http://doi.acm.org/10.1145/962342.964333>

- Keszei B, Dull A, Logo E, Hamornik BP, Koles M, Tovolgyi S, Hercegi K (2014) Visual attention and spatial behavior in VR environment: an environmental psychology approach. In: 2014 5th IEEE conference on cognitive infocommunications (CogInfoCom). IEEE, pp 247–250
- Kifor T, Gottdank T, Hajnal A, Baranyi P, Korondi B, Korondi P (2011) Smartphone emotions based on human-dog interaction. In: 2011 2nd international conference on cognitive infocommunications (CogInfoCom), pp 1–6
- Kimura M, Uwano H, Ohira M, Matsumoto KI (2009) Toward constructing an electroencephalogram measurement method for usability evaluation. In: Jacko JA (ed) Human-computer interaction. New trends. Springer, Berlin, pp 95–104
- Kiss G, Vicsi K (2014) Physiological and cognitive status monitoring on the base of acoustic-phonetic speech parameters. In: Besacier L, Dediu A-H, Martin-Vide C (eds) Statistical language and speech processing. Springer, Berlin, pp 120–131
- Kiss G, Sztaho D, Vicsi K, Golemis A (2014) Connection between body condition and speech parameters - especially in the case of hypoxia. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 333–336
- Kitagawa M, Dokko D, Okamura A, Yuh D (2005) Effect of sensory substitution on suture-manipulation forces for robotic surgical systems. *J Thorac Cardiovasc Surg* 129(1):151–158
- Koles M, Hercegi K, Logo E, Tovolgyi S, Szabo B, Hamornik BP, Komlodi A, Baranyi PZ, Galambos P, Persa G (2014) Collaboration experience in immersive VR environment in the frame of the NeuroCogSpace project. In: 2014 5th IEEE conference on cognitive infocommunications (CogInfoCom). IEEE, pp 373–376
- Kolmogorov A (1957) On the representation of continuous functions of many variables by superposition of continuous functions of one variable and addition. *Dokl Akad Nauk USSR* 114:953–956
- Koltay K, Borbely M, Dani E, Balazs L, Csernoch M, Bujdosó G (2013) Users' retrieval skills in library environment: ways to measure and improve them. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 319–323
- Kondor D, Csabai I, Dobos L, Szule J, Barankai N, Hanyecz T, Sebok T, Kallus Z, Vattay G (2013) Using robust PCA to estimate regional characteristics of language use from geo-tagged twitter messages. In: 4th IEEE international conference on cognitive infocommunications, pp 393–398
- Kovács S, Vincze D, Gácsi M, Miklosi A, Korondi P (2009) Interpolation based fuzzy automaton for human-robot interaction. In: Preprints of the 9th international symposium on robot control (SYROCO'09). The International Federation of Automatic Control (IFAC), Nagaragawa Convention Center, Gifu, pp 451–456
- Kovesdan G, Asztalos M, Lengyel L (2014) Fast android application development with component modeling. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 515–520
- Kozma R (1991) Learning with media. *Rev Educ Res* 61(2):179–212
- Krafft J (2003) Vertical structure of the industry and competition: an analysis of the evolution of the info-communications industry. *Telecommun Policy* 27(8):625–649
- Krafft J (2010) Profiting in the info-coms industry in the age of broadband: lessons and new considerations. *Technol Forecast Soc Chang* 77(2):265–278
- Kurian G, Anand M (2014) GENKEY - 2400 - The Internet of everything ecosystem - bringing IT and OT together with the Internet of things, San Francisco. https://www.ciscolive.com/online/connect/sessionDetail.wv?SESSION_ID=78188
- Lakatos G, Miklosi A (2012) How can the ethological study of dog-human companionship inform social robotics? In: Birke L, Hockenhull J (eds) Crossing boundaries: investigating human-animal relationships. Brill, Leiden, pp 187–208
- de Lathauwer L, Moor BD, Vandewalle J (2000) A multi linear singular value decomposition. *SIAM J Matrix Anal Appl* 21(4):1253–1278
- Latre B, Braem B, Moerman I, Blondia C, Demeester P (2011) A survey on wireless body area networks. *Wirel Netw* 17(1):1–18
- Lederman S (2004) Haptic identification of common objects: effects of constraining the manual exploration process. *Percept Psychophys* 66(4):618–628

- Lee EA, Seshia SA (2011) Introduction to embedded systems - a cyber-physical systems approach. LuLu, Berkeley. ISBN:978-1312-42740-2. <http://LeeSeshia.org>
- Lee H, Lee J, Seo S (2009) Brain response to good and bad design. In: Jacko JA (ed) Human-computer interaction. New trends. Springer, Berlin, pp 111–120
- Lemmens P, Bussemakers M, De Haan A (2001) Effects of auditory icons and earcons on visual categorization: the bigger picture. In: Proceedings of the international conference on auditory display (ICAD'01), Helsinki, pp 117–125
- Leung WK, Yuen KW, Wong KH, Meng H (2013) Development of text-to-audiovisual speech synthesis to support interactive language learning on a mobile device. In: 4th IEEE international conference on cognitive infocommunications, pp 583–588
- Lewis TG (2009) Network science: theory and applications. Wiley, Hoboken, NJ, USA. ISBN: 978-0470331880
- Li Z, Giannini F, Falcidieno B, Pernot JP, Veron P (2013) Towards a new approach for the description of shapes from multimodal data. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 109–114
- Liao Sh (2003) Knowledge management technologies and applications-literature review from 1995 to 2002. *Expert Syst Appl* 25(2):155–164
- Liu YL (2013) Convergence in the digital age. *Telecommun Policy* 37(8):611–614. doi:[10.1016/j.telpol.2013.04.012](https://doi.org/10.1016/j.telpol.2013.04.012)
- Logo E, Hamornik BP, Koles M, Hercegi K, Tovolgyi S, Komlodi A (2014) Usability related human errors in a collaborative immersive VR environment. In: 2014 5th IEEE conference on cognitive infocommunications (CogInfoCom). IEEE, pp 243–246
- Lorentz G (1966) Approximation of functions. Holt, Reinhard and Winston, New York
- Maclean K, Enriquez M (2003) Perceptual design of haptic icons. In: Proceedings of eurohaptics 2003, pp 351–363
- Madhyastha T, Reed A (1994) A framework for sonification design. In: Kramer G (ed) Auditory display. Addison-Wesley, Reading
- Marentakis G, Brewster SA (2005) A comparison of feedback cues for enhancing pointing efficiency in interaction with spatial audio displays. In: Proceedings of the 7th international conference on human computer interaction with mobile devices & services, pp 55–62
- Massimino M (1992) Sensory substitution for force feedback in space teleoperation. Ph.D. thesis, MIT, Department of Mechanical Engineering
- Matsubara D, Egawa T, Nishinaga N, Shin MK, Kafle VP, Galis A (2013) Open the way to future networks – a viewpoint framework from ITU-T. Springer, Berlin
- Matuszka T, Vinceller Z, Laki S (2013) On a keyword-lifecycle model for real-time event detection in social network data. In: 4th IEEE international conference on cognitive infocommunications, pp 453–458
- McGee M (2002) Investigating a multimodal solution for improving force feedback generated textures. Ph.D. thesis, University of Glasgow
- Melody WH (1997) Telecom reform: principles, policies and regulatory practices. Den Private Ingeniørfond, Technical University of Denmark
- Mihalydeak T, Csajbok ZE (2013) Membranes with boundaries. In: Membrane computing. Springer, Berlin, pp 277–294
- Mikhaylov K, Pitkaaho T, Tervounen J, Niemela M (2013) Wireless sensor glove interface and its application in digital holography. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 325–329
- Miklosi A, Soproni K (2006) A comparative analysis of animals' understanding of the human pointing gesture. *Anim Cogn* 9(2):81–93
- Miklosi A, Kubinyi E, Topal J, Gacsi M, Viranyi Z, Csanyi V (2003) A simple reason for a big difference: wolves do not look back at humans, but dogs do. *Curr Biol* 13(9):763–766
- Minutolo A, Esposito M, De Pietro G (2012) Development and customization of individualized mobile healthcare applications. In: 3rd IEEE international conference on cognitive infocommunications, Kosice, pp 321–326

- Mitola J, Maguire G (1999) Cognitive radio: making software radios more personal. *IEEE Pers Commun* 6(4):13–18
- Mori M (1970) Bukimi no tani (Uncanny valley effect). *Energy* 7(4):33–35
- Mulas F, Pilloni P, Manca M, Boratto L, Carta S (2013) Linking human-computer interaction with the social web: a web application to improve motivation in the exercising activity of users. In: 4th IEEE international conference on cognitive infocommunications, pp 351–356
- Mustonen M (2008) A review-based conceptual analysis of auditory signs and their design. In: *Proceeding of ICAD*
- Nannicelli T, Taberham P (eds) (2014) *Cognitive media theory*, 1st edn. Routledge, New York/London
- Nass CI, Yen C (2010) *The man who lied to his laptop: what machines teach us about human relationships*. Current Trade Penguin Group, New York, NY, USA
- Navarretta C (2014a) Feedback facial expressions and emotions. *J Multimodal User Interfaces* 8(2):135–141
- Navarretta C (2014b) Predicting emotions in facial expressions from the annotations in naturally occurring first encounters. *Knowl-Based Syst* 71:34–40
- Navarretta C (2014c) Speech, emotions and facial expressions in dyadic spontaneous conversations. *Intell Decis Technol* 8(4):255–263
- Newman M, Barabasi AL, Watts DJ (2006) *The structure and dynamics of networks*. Princeton University Press, Princeton
- Nguyen KK, Cheriet M, Lemay M, Arnaud BS, Reijs V, Mackarel A, Minoves P, Pastrama A, Van Heddeghem W (2011) *Renewable energy provisioning for ICT services in a future Internet*. Springer, Berlin
- Niitsuma M, Hashimoto H (2009) Observation of human activities based on spatial memory in intelligent space. *J Rob Mechatronics* 21(4):515–523
- Niitsuma M, Hashimoto H, Hashimoto H (2007) Spatial memory as an aid system for human activity in intelligent space. *IEEE Trans Ind Electron* 54(2):1122–1131
- Nijholt A, Tan D (2008) Brain-computer interfacing for intelligent systems. *IEEE Intell Syst* 23(3):72–79
- Ning H, Wang Z (2011) Future Internet of things architecture: like mankind neural system or social organization framework? *IEEE Commun Lett* 15(4):461–463
- Nishinaga N (2010) NICT new-generation network vision and five network targets. *IEICE Trans Commun* 93(3):446–449
- Norman D (1991) *Cognitive artifacts*. Cambridge University Press, New York, pp 17–38. <http://www.portal.acm.org/citation.cfm?id=120352.120354>
- OECD (1992) *Telecommunications and broadcasting: convergence or collision?* Organization for Economic Cooperation and Development, Paris
- OECD (2011) *Guide to measuring the information society*. Organization for Economic Cooperation and Development, Paris
- Origlia A, Galata V, Cutugno F (2014) Introducing context in syllable-based emotion tracking. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 337–342
- Ousterhout T, Dyrholm M (2013) Cortically coupled computer vision with emotiv headset using distractor variables. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 245–249
- Pallot M, Trousse B, Senach B (2012) A tentative design of a future Internet networking domain landscape. In: *The future Internet*. Springer, Berlin, pp 237–249
- Palovics R, Daroczy B, Benczur AA (2013) Temporal prediction of retweet count. In: 4th IEEE international conference on cognitive infocommunications, pp 267–270
- Pang ASK (2013) *The distraction addiction: getting the information you need and the communication you want, without enraging your family, annoying your colleagues, and destroying your soul*. Hachette, New York

- Papadimitratos P, La Fortelle A, Evenssen K, Brignolo R, Cosenza S (2009) Vehicular communication systems: enabling technologies, applications, and future outlook on intelligent transportation. *IEEE Commun Mag* 47(11):84–95
- Papadimitriou D, Zahariadis T, Martinez-Julia P, Papafili I, Morreale V, Torelli F, Sales B, Demeester P (2012) Design principles for the future Internet architecture. In: Álvarez F et al (eds) *The future Internet*. Springer, Berlin, pp 55–67
- Pavani F, Spence C, Driver J (2000) Visual capture of touch: out-of-the-body experiences with rubber gloves. *Psychol Sci* 11(5):353–359
- Pentland A (2007) Social signal processing. *IEEE Signal Process Mag* 24(4):108
- Pentland A (2008) *Honest signals: how they shape our world*. MIT Press, London
- Perera C, Zaslavsky A, Christen P, Georgakopoulos D (2014) Context aware computing for the Internet of things: a survey. *IEEE Commun Surv Tutor* 16(1):414–454
- Persa G, Csapo A, Baranyi P (2012) CogInfoCom systems from an interaction perspective – a pilot application for EtoCom. *J Adv Comput Intell Inform* 16(2):297–304
- Persa G, Torok A, Galambos P, Sulykos I, Kecskes-Kovacs K, Czigler I, Honbolygo F, Baranyi P, Csepe V (2014) Experimental framework for spatial cognition research in immersive virtual space. In: 2014 5th IEEE conference on cognitive infocommunications (CogInfoCom). IEEE, pp 587–593
- Petcu D, Galis A (2013) Introduction to chapter on computing and networking clouds. In: *The future Internet: cloud computing, networking and mobility*. Springer, Heidelberg, pp xiii–xv
- Picard RW (1995) *Affective computing*. The MIT Press, Cambridge
- Picard R (1997) *Affective computing*. The MIT Press, Cambridge
- Picard RW (2003a) Affective computing: challenges. *Int J Hum Comput Stud* 59(1):55–64
- Picard RW (2003b) What does it mean for a computer to “have” emotions. In: Trapp R, Petta P, Payr S (eds) *Emotions in humans and artifacts*. MIT Press, Cambridge, pp 213–235
- Pieska S, Kaarela J, Luimula M (2014) Enhancing innovation capability with cognitive infocommunications. *Intell Decis Technol* 9(1):67–78
- Pinto M, Cavallo V, Ohimann T, Espie S, Roge J (2004) The perception of longitudinal accelerations: what factors influence braking manoeuvres in driving simulators? In: *Conférence simulation de conduite*, pp 139–151
- Pirhonen A (2006) Non-speech sounds as elements of a use scenario: a semiotic perspective. In: *Proceedings of the 12th international conference on auditory display (ICAD2006)*, London
- Platzer E, Petrovic O (2011) An experimental deprivation study of mobile phones, Internet and TV. *Comput Technol Appl* 2(8):600–606
- Pontonnier C, Dumont G, Samani A, Madeleine P, Badawi M (2014) Designing and evaluating a workstation in real and virtual environment: toward virtual reality based ergonomic design sessions. *J Multimodal User Interfaces* 8(2):199–208
- Preece J, Rogers Y, Sharp H, Benyon D, Holland S, Carey T (1994) *Human-computer interaction*. Addison-Wesley Longman Ltd, Harlow, UK
- Preissl B, Muller J (2006) *Governance of communication networks: connecting societies and markets with IT*. Physica, Heidelberg
- Prekopcsak Z, Halacsy P, Gaspar-Papanek C (2008) Design and development of an everyday hand gesture interface. In: *Proceedings of the 10th international conference on human computer interaction with mobile devices and services*, pp 479–480
- Prekopcsak Z, Makrai G, Henk T, Gaspar-Papanek C (2011) Radoop: analyzing big data with rapidminer and hadoop. In: *Proceedings of the 2nd RapidMiner community meeting and conference (RCOMM 2011)*, pp 865–874
- Prinz J (2006) Putting the brakes on enactive perception. *Psyche* 12:1–19
- Pusztá A, Szule J, Laki S (2013) Near real-time thematic clustering of web documents and other Internet contents. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 307–312
- Raptis S (2013) Exploring latent structure in expressive speech. In: 4th IEEE international conference on cognitive infocommunications. IEEE, pp 741–746

- Rasmussen J (1982) Human errors: a taxonomy for describing human malfunction in industrial installations. *J Occup Accid* 4(2):311–333
- Reason J (1990) *Human error*. Cambridge University Press, Cambridge
- Recker M, Ram A, Shikano T, Li G, Stasko J (1995) Cognitive media types for multimedia information access. *J Educ Multimedia Hypermedia* 4(2–3):183–210
- Riecke BE, Schulte-Pelkum J, Caniard F, Bulthoff HH (2005) Towards lean and elegant self-motion simulation in virtual reality. In: *Proceedings of virtual reality, 2005 (VR 2005)*. IEEE, pp 131–138
- Riva G, Davide F (2001) *Communications through virtual technologies. Identity, community and technology in the communication age*. IOS Press, Amsterdam, pp 124–154
- Rochlis J (2002) *Human factors and telerobotics: tools and approaches for designing remote robotics workstation displays*. Ph.D. thesis, Massachusetts Institute of Technology
- Romportl J, Zackova E, Kelemen J (eds) (2015) *Beyond artificial intelligence – the disappearing human-machine divide. Topics in intelligent engineering and informatics, vol 9*. Springer International Publishing, Switzerland
- Roschelle J (1996) *Designing for cognitive communication: epistemic fidelity or mediating collaborative inquiry?* In: *Computers, communication and mental models*. Taylor & Francis, London, UK pp 15–27
- RTC (2008) *Robot technology component specification*. <http://www.omg.org/spec/RTC/>
- Ruxton GD, Schaefer HM (2011) Resolving current disagreements and ambiguities in the terminology of animal communication. *J Evol Biol* 24(12):2574–2585
- Ryan M et al. (eds) (2003) *The EU regulatory framework for electronic communications and related EU legislation*. Handbook. Arnold and Porter, London
- Saito T (1994) An evolving scenario of communication network towards b-ISDN. In: Iversen VB (ed) *Integrated broadband communication networks and services, vol 18*. North Holland, Amsterdam
- Sales B, Darmois E, Papadimitriou D, Bourse D (2012) A systematic approach for closing the research to standardization gap. In: Álvarez F et al (eds) *The future Internet*. Springer, Berlin, pp 18–29
- Sallai G (2007) *Converging information, communication and media technologies*. In: Banse G (ed) *Assessing societal implications of converging technological development*. Edition Sigma, Berlin, pp 25–43
- Sallai G (2012a) The cradle of cognitive infocommunications. *Acta Polytech Hung* 9(1):171–181
- Sallai G (2012b) Defining infocommunications and related terms. *Acta Polytech Hung* 9(6):5–15
- Sallai G (2013a) Chapters of Future Internet Research. In: *2013 IEEE 4th international conference on cognitive infocommunications (CogInfoCom)*. IEEE, New York, pp 161–166
- Sallai G (2013b) The FIRST project and the Future Internet National Research Programme. In: *Future Internet PPP workshop on building an eco-system for delivering innovative future Internet services and applications, IEEE ICC 2013*. IEEE, Budapest
- Sallai G (2013c) From telecommunications to cognitive infocommunications and Internet of things - phases of digital convergence. In: *2013 IEEE 17th international conference on intelligent engineering systems (INES)*, pp 13–17
- Sallai G (2014) *Future Internet visions and research clusters*. *Acta Polytech Hung* 11(7):5–24
- Sayrafian-Pour K, Yang WB, Hagedorn J, Terrill J, Yazdandoost KY, Hamaguchi K (2010) Channel models for medical implant communication. *Int J Wireless Inf Networks* 17(3–4):105–112
- Sayrafian-Pour K, Hagedorn J, Barbi M, Terrill J, Alasti M (2013) A simulation platform to study inter-BAN interference. In: *4th IEEE international conference on cognitive infocommunications*, pp 345–350
- Scaletti C (1994) *Sound synthesis algorithms for auditory data representations*. In: Kramer G (ed) *Auditory display*. Addison-Wesley, Reading
- Schmorrow D, Stanney KM, Wilson G, Young P (2006) *Augmented cognition in human-system interaction*. In: *Handbook of human factors and ergonomics, 3rd edn*. Wiley, New York, pp 1364–1383

- Scott-Phillips TC, Blythe RA, Gardner A, West SA (2012) How do communication systems emerge? *Proc R Soc B Biol Sci* 279(1735):1943–1949
- Sharmin S (2003) Evaluating non-visual feedback cues for touch input device. In: Evreinov G (ed) *New interaction techniques*. University of Tampere, Tampere. pp 3–9. ISBN:951-44-5188-0
- Sharples M, Jeffery N, Du Boulay JBH, Teather D, Teather B, Du Boulay GH (2002) *Socio-cognitive engineering: a methodology for the design of human-centred technology*. *Eur J Oper Res* 136(2):310–323
- Sheridan T (1992) Musings on telepresence and virtual presence. *Presence Teleoperators Virtual Environ* 1(1):120–126
- Sheridan T (1994) Human factors considerations for remote manipulation, In: *Proceedings of the advanced guidance and control aspects in robotics*, Lisbon, pp 1–24 ISBN: 92-835-0751-7
- Sheth AP (2009) Citizen sensing, social signals, and enriching human experience. *IEEE Internet Comput* 13(4):87
- Shneiderman B (1998) *Designing the user interface: strategies for effective human-computer interaction*, 3rd edn. Addison-Wesley, Reading
- Skinner A, Long L, Vice J, Blitch J, Fidopiastis CM, Berka C (2013) Augmented interaction: applying the principles of augmented cognition to human-technology and human-human interactions. In: *Foundations of augmented cognition*. Springer, Berlin, pp 764–773
- Smith D (1975) *Pygmalion: a computer program to model and stimulate creative thought*. Ph.D. thesis, Stanford University, Department of Computer Science
- Smith IG (2012) *The Internet of things 2012: new horizons*. CASAGRAS2, Halifax
- Smith C, Kisiel K, Morrison J (2009) *Working through synthetic worlds*. Ashgate, London
- Solvang B, Sziebig G (2012) On industrial robots and cognitive info-communication. In: *3rd IEEE international conference on cognitive infocommunications*, Kosice, pp 459–464
- Spitters S, Sanders M, op den Akker R, Bruijnes M (2013) The recognition of acted interpersonal stance in police interrogations. In: *4th IEEE international conference on cognitive infocommunications*, Budapest, pp 65–70
- Sprecher D (1965) On the structure of continuous functions of several variables. *Trans Am Math Soc* 115:340–355
- St John M, Kobus DA, Morrison JG, Schmorow D (2004) Overview of the DARPA augmented cognition technical integration experiment. *Int J Hum Comput Interact* 17(2):131–149
- Staal MA, Bolton AE, Yaroush RA, Bourne LE Jr (2008) Cognitive performance and resilience to stress. In: Lukey B, Tepe V (eds) *Biobehavioral resilience to stress*. Francis & Taylor, London, pp 259–299
- Stanney KM, Schmorow DD, Johnston M, Fuchs S, Jones D, Hale KS, Ahmad A, Young P (2009) Augmented cognition: an overview. *Rev Hum Factors Ergon* 5(1):195–224
- Stein B, Wallace M, Meredith A (1995) Neural mechanisms mediating attention and orientation to multisensory cues. In: Gazzaniga M (ed) *The cognitive neurosciences*. MIT Press, Cambridge, pp 683–702
- Stone L (2011) Just breathe: building the case for email apnea (the huffington post). http://www.huffingtonpost.com/linda-stone/just-breathe-building-the_b_85651.html
- Stratogiannis DG, Tsiropoulos GI, Vinel A, Koucheravy Y, Tsiropoulou EE (2013) Special issue on mobile computing and networking technologies. *Telecommun Syst* 52(4):1714–2145
- Streitz N, Nixon P (2005) The disappearing computer. *Commun ACM* 48(3):32–35
- Sun R, Merrill E, Peterson T (2001) From implicit skills to explicit knowledge: a bottom-up model of skill learning. *Cognit Sci* 25(2):203–244
- Szabo C, Roka A, Farago T, Gacsi M, Miklosi A, Korondi P (2012) Building a human-dog interaction inspired emotional engine model. In: *IECON 2012 38th annual conference on IEEE industrial electronics society*, pp 5516–5522
- Szabo R, Farkas K, Ispany M, Benczur AA, Batfai N, Jeszenszky P, Laki S, Vagner A, Kollar L, Sidlo C (2013) Framework for smart city applications based on participatory sensing. In: *4th IEEE international conference on cognitive infocommunications*, pp 295–300

- Szegletes L, Koles M, Forstner B (2014) The design of a biofeedback framework for dynamic difficulty adjustment in games. In: 5th IEEE international conference on cognitive infocommunications, Vietri sul Mare, pp 295–299
- Szucs G (2013) Decision trees and random forest for privacy-preserving data mining. In: Tarnay K, Imre S, Xu L (eds) Research and development in e-business through service-oriented solutions. IGI Global, Hershey, pp 71–90
- Stevenson D (ed) (1997) Information and communications technology in UK schools, an Independent Inquiry. The Independent ICT in Schools Commission, London
- Takagi H (2001) Interactive evolutionary computation: fusion of the capabilities of EC optimization and human evaluation. *Proc IEEE* 89(9):1275–1296
- Tan D, Nijholt A (2010) Brain-computer interfaces: applying our minds to human-computer interaction. Springer, Berlin
- Tanaka H, Sakti S, Neubig G, Toda T, Campbell N, Nakamura S (2012) Non-verbal cognitive skills and autistic conditions: an analysis and training tool. In: 3rd IEEE international conference on cognitive infocommunications, Kosice, pp 41–46
- Tapolcai J, Gulyas A, Heszbergery Z, Biro J, Babarcsi P, Trossen D (2012) Stateless multi-stage dissemination of information: source routing revisited. In: 2012 IEEE Global communications conference (GLOBECOM), pp 2797–2802
- Tapolcai J, Heszberger Z, Retvari G, Biro J (2013) Reduced information scenario for shared segment protection. In: 4th IEEE international conference on cognitive infocommunications, pp 589–594
- Taylor TL (2002) Living digitally: embodiment in virtual worlds. In: The social life of avatars. Springer, London, pp 40–62
- Telpolicy (1994) Special issue on competition and convergence. *Telecommun Policy* 18(8)
- Thomas RW, Friend DH, Dasilva LA, Mackenzie AB (2006) Cognitive networks: adaptation and learning to achieve end-to-end performance objectives. *IEEE Commun Mag* 44(12):51–57
- Thomessen T, Kosicki T (2011) Cognitive audio-visual infocommunication applied in remote support for industrial robot systems. In: 2011 2nd international conference on cognitive infocommunications (CogInfoCom), pp 1–5
- Thomessen T, Niitsuma M (2013) Cognitive human-machine interface with multi-modal man-machine communication. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 873–876
- Todorov E (2004) Optimality principles in sensorimotor control. *Nat Neurosci* 7(9):907–915
- Topal J, Miklosi A, Csanyi V, Doka A (1998) Attachment behavior in dogs (*canis familiaris*): a new application of Ainsworth's (1969) strange situation test. *J Comp Psychol* 112(3):219
- Torok M, Kosa Z (2015) Association in knowledge management technologies. In: 2015 IEEE 13th international symposium on applied machine intelligence and informatics (SAMII). IEEE, pp 301–306
- Torok M, Toth MJ, Szollosi A (2013) Foundations and perspectives of mathability in relation to the CogInfoCom domain. In: 4th IEEE international conference on cognitive infocommunications, Budapest, pp 869–872
- Torok A, Sulykos I, Kecskes-Kovacs K, Persa G, Galambos P, Kobor A, Czigler I, Csepe V, Baranyi P, Honbolygo F (2014) Comparison between wireless and wired EEG recordings in a virtual reality lab: case report. In: 2014 5th IEEE conference on cognitive infocommunications (CogInfoCom). IEEE, pp 599–603
- Toth B, Nagy P, Nemeth G (2012) New features in the voxaid communication aid for speech impaired people. Springer, Berlin
- Trinh TA, Gyarmati L, Sallai G (2011) Understanding the impact of loyal user behaviour on Internet access pricing: a game-theoretic framework. *Telecommun Syst* 48(1–2):43–61
- Trung DN, Jung JJ, Kiss A (2013) Towards modeling fuzzy propagation for sentiment analysis in online social networks: a case study on TweetScope. In: 4th IEEE international conference on cognitive infocommunications, pp 331–338
- Tselentis G et al (eds) (2010) Towards the future Internet: emerging trends from European research. In: Future Internet assembly, Valencia. IOS Press, Amsterdam

- Uckelmann D, Harrisson M, Michahelles F (eds) (2011) *Architecting the Internet of things*. Springer, Berlin
- Ullah S, Higgins H, Braem B, Latre B, Blondia C, Moerman I, Saleem S, Rahman Z, Kwak KS (2012) A comprehensive survey of wireless body area networks. *J Med Syst* 36(3):1065–1094
- Valiant LG (1999) Robust logics. In: *Proceedings of the 31st annual ACM symposium on theory of computing*, pp 642–651. <http://www.dl.acm.org/citation.cfm?id=301425>
- Valiant LG (2003) Three problems in computer science. *J ACM* 50(1):96–99. <http://www.dl.acm.org/citation.cfm?id=602410>
- Valiant LG (2013) *Probably approximately correct: nature's algorithms for learning and prospering in a complex world*. Basic Books, New York, NY, USA
- Valtonen TP (2001) *Governmental visions for future info-communication-a survey of the European union, the United States and Japan*. Technical report no. 425, Turku Centre for Computer Sciences
- Van Do T, Chakka R, Sztrik J (2013) Spectral expansion solution methodology for QBD-M processes and applications in future Internet engineering. In: Nguyen NT, Do TV, Le Thi HA (eds) *Advanced computational methods for knowledge engineering*. Springer, Heidelberg, pp 131–142
- Vermesan O, Friess P (2013) *Internet of things: converging technologies for smart environments and integrated ecosystems*. River Publishers, Aalborg
- Vernier F, Nigay L (2001) A framework for the combination and characterization of output modalities. In: Palanque P, Fabio P (eds) *Interactive systems design, specification, and verification*. Lecture notes in computer science, vol 1946. Springer, Berlin/Heidelberg, pp 35–50
- Verner L, Okamura A (2006) Sensor/actuator asymmetries in telemanipulators: implications of partial force feedback. In: *Proceedings of 14th symposium on haptic interfaces for virtual environments and teleoperator systems*, Arlington, pp 309–314
- Vernon D, Metta G, Sandini G (2007) A survey of artificial cognitive systems: implications for the autonomous development of mental capabilities in computational agents. *IEEE Trans Evol Comput* 11(2):151–179
- Vidal J (1973) Toward direct brain-computer communication. *Ann Rev Biophys Bioeng* 2:157–180
- Vilhjalmsson HH, Cassell J (1998) Bodychat: autonomous communicative behaviors in avatars. In: *Proceedings of the 2nd international conference on autonomous agents*, pp 269–276
- Vinciarelli A, Pantic M, Bourlard H, Pentland A (2008) Social signals, their function, and automatic analysis: a survey. In: *Proceedings of the 10th international conference on multimodal interfaces*, pp 61–68
- Vinciarelli A, Pantic M, Bourlard H (2009) Social signal processing: survey of an emerging domain. *Image Vision Comput* 27(12):1743–1759
- Vincze D, Kovacs S, Gacsi M, Korondi P, Miklosi A, Baranyi P (2012) A novel application of the 3d virca environment: modeling a standard ethological test of dog-human interactions. *Acta Polytech Hung* 9(1):107–120
- Viranyi Z, Topal J, Gacsi M, Miklosi A, Csanyi V (2004) Dogs respond appropriately to cues of humans-attentional focus. *Behav Processes* 66(2):161–172
- Vogel C (2013) Multimodal conformity of expression between blog names and content. In: *2013 IEEE 4th international conference on cognitive infocommunications (CogInfoCom)*. IEEE, pp 23–28
- Voisin J, Lamarre Y, Chapman C (2002) Haptic discrimination of object shape in humans: contribution of cutaneous and proprioceptive inputs. *Exp Brain Res* 145(2):251–260
- Waggoner Z (2009) *My avatar, my self: identity in video role-playing games*. McFarland, Jefferson
- Wainwright N, Papanikolaou N (2012) *Introduction: the FIA research roadmap, priorities for future Internet research*. In: *The future Internet*. Springer, Berlin, pp 1–5
- Wang Y (2002) On cognitive informatics (keynote speech). In: *1st IEEE international conference on cognitive informatics*, Calgary, pp 34–42
- Wang Y (2008) On concept algebra: a denotational mathematical structure for knowledge and software modeling. *Int J Cognit Inform Nat Intell* 2(2):1–19

- Wang Y, Kinsner W (2006) Recent advances in cognitive informatics. *IEEE Trans Syst Man Cybern* 36(2):121–123
- Watabe T, Niitsuma M (2013) Mental map generation assistance tool using relative pitch difference and angular information for visually impaired people. In: 4th IEEE international conference on cognitive infocommunications, pp 255–260
- WEF (2007) World Economic Forum: digital ecosystem - convergence between IT, Telecoms, Media and Entertainment: Scenarios to 2015. World Scenario Series
- Weikum G, Ntarmos N, Spaniol M, Triantafillou P, Benczúr A et al (2011) Longitudinal analytics on web archive data: it's about time! 5th Biennial Conference on Innovative Data Systems Research (CIDR 2011), 9–12 January 2011, pp 199–202. Asilomar
- Welch R, Warren D (1986) Intersensory interactions. In: Boff L, Thomas J (eds) *Handbook of perception and human performance*, vol 1. Wiley, New York, pp 25–36
- Wilson L (2003) Interactivity or interpassivity: a question of agency in digital display. In: *Proceedings of the 5th international digital arts and culture conference*, Melbourne, pp 1–4
- Wolpert DM, Ghahramani Z (2000) Computational principles of movement neuroscience. *Nat Neurosci* 3:1212–1217
- Wolpert DM, Kawato M (1998) Multiple paired forward and inverse models for motor control. *Neural Netw* 11(7):1317–1329
- WUN CogCom (2008) Worldwide universities network cognitive communications consortium - established. <http://www.wun-cogcom.org/>
- Yang GZ (2014) *Body sensor networks*, 2nd edn. Springer, Berlin
- Yang WB, Sayrafian-Pour K (2012) Interference mitigation using adaptive schemes in body area networks. *Int J Wireless Inf Netw* 19(3):193–200
- Yao Y (2009) Interpreting concept learning in cognitive informatics and granular computing. *IEEE Trans Syst Man Cybern* 39(4):855–866
- Yoonaidharma S, Kilenthong W, Bunaramrueang P, Kesavayuth D (2014) Special issue on moving forward with future technologies: opening a platform for all. *Telecommun Policy* 38(8–9): 659–850
- Yuce MR (2010) Implementation of wireless body area networks for healthcare systems. *Sensors Actuators A Phys* 162(1):116–129. doi:10.1016/j.sna.2010.06.004
- Zahariadis T, Daras P, Bouwen J, Niebert N, Griffin D, Álvarez F et al (2010) Towards a content-centric Internet. In: Tselentis G et al (eds) *Towards the future Internet - emerging trends from European Research*. IOS Press, Amsterdam, pp 227–236
- Zahariadis T, Papadimitriou D, Tschofenig H, Haller S, Daras P, Stamoulis GD, Hauswirth M (2011) *Towards a future Internet architecture*. Springer, Berlin
- Zander TO, Kothe C (2011) Towards passive brain-computer interfaces: applying brain-computer interface technology to human-machine systems in general. *J Neural Eng* 8(2):025005
- Zeller D, Olsson M, Blume O, Fehske A, Ferling D, Tomaselli W, Godor I (2013) Sustainable wireless broadband access to the future Internet-the earth project. Springer, Berlin
- Zhang D, Guo B, Yu Z (2011) The emergence of social and community intelligence. *Computer* 44(7):21–28
- Ziegler S, Crettaz C, Ladid L, Krco S, Pokric B, Skarmeta AF, Jara A, Kastner W, Jung M (2013) *IoT6 - moving to an IPv6-based future IoT*. In: FIA. Springer, Berlin
- Zimmerman T (1996) Personal area networks: near-field intrabody communication. *IBM Syst J* 35(3):609–617
- Zimmerman TG (1999) Wireless networked digital devices: a new paradigm for computing and communication. *IBM Syst J* 38(4):566–574

Glossary

This glossary summarizes those terms that were either newly introduced, or considered from a novel perspective in the book. The numbers listed next to each of the items refer to the sections which may be consulted for further details (in some cases, more than one section is indicated if the same term is discussed in different places from different perspectives).

3D Internet – 12.4

CogInfoCom channels – 5.1, 8.1.2

Cognitive capabilities – 2.3.2

Cognitive entity – 2.3.2

Cognitive Internet Ecosystem – 13.2

Cognitive networks – 3.2.3, 4.6

Conceptual mapping (direct/analogy-based) – 9.2

Cues – 11.2

Data and content technologies – 12.4

Digital convergence – 3.1, 3.3

Digital Ecosystem – 3.1, 3.3, 13.1

Electronic communications – 3.2.2

Ethologically inspired CogInfoCom (EtoCom) – 6.4

Future Internet – 12

FI PPP (Future Internet Public-Private Partnership) – 12.2

Generation CE – 2.3.2

- Human-ICT entanglement** – 2.3.1
- Icons** – 5.4, 7.3
- Infocommunications** – 3.2.3
- Information and Communications(s) Technology (ICT)** – 3.3
- Intra-cognitive/inter-cognitive modes** – 2.2.1
- Internet Ecosystem** – 13.1
- Internet of Everything** – 12.2
- Internet of Things** – 3.2.4, 12.4
- Internet Science/Engineering/Practice** – 12.4
- Mathability** – 6.6
- Messages** – 5.4, 7.3
- Modality** – 8.1.3
- TIM (telecommunications, information and media) convergence** – 3.1, 3.2.3
- Triggers (voluntary/involuntary, direct/indirect)** – 11.3
- Representation-sharing/Representation-bridging types** – 2.2.2
- Ritualization** – 11.2
- Sensor-sharing/Sensor-bridging types** – 2.2.2
- Signals** – 11.2
- Socio-cognitive ICT** – 5.3
- Speechability** – 5.2
- Spiral Discovery Method (SDM)** – 10.1
- Streams** – 7.3
- Tangleface/Tangleaction** – 2.3.1, 6.4.1

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