

Cognition, affects & interaction

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2016-2017

Contenu du cours

- Le but de ce cours est de donner une vision la plus large possible des champs disciplinaires invoqués dans la gestion d'une interaction complexe entre un humain et un robot social, du niveau des signaux échangés à l'estimation d'états mentaux et affectifs en passant par les technologies impliquées dans l'analyse, le traitement et la génération des comportements multimodaux régulant ces évaluations cognitives. Le cours est organisé en
 - Exposé introductif (1h)
 - 5 cours magistraux (5x2h)
 - un studio de 4 heures de travail (2x2h) en binôme sur des thèmes transversaux qui se conclura par un exposé (1x3h) à la fin de la session.
- Mots clefs : *Théorie de l'esprit; Architectures cognitives ; Informatique affective ; Dispositifs interactifs ; Apprentissage automatique; Adaptation mutuelle ; Acceptabilité/évaluation de comportements.*
- Compétences acquises : *Comprendre les fondements du raisonnement cognitif et de l'interaction homme-robot*

Agenda

- Gérard BAILLY – Sylvie PESTY
- 12 nov 10:00-11:00: Introduction
- 12 nov 11:00-12:00: CM n°1: Théorie de l'esprit et multimodalité
- 19 nov 10:00-13:00: CM n°2: Interaction située Humain-Robot + dispositifs + apprentissage de comportements
- 26 nov 10:00-12:00: CM n°3: Introduction à l'IA + Architectures cognitives
- 1 déc 10:00-12:00: TD n°1: avancement sur le thème (travail en binômes)
- 10 déc 10:00-12:00: CM n°4: Adaptation mutuelle : synchronie, alignement des comportements
- 17 déc 10:00-12:00: TD n°2 : avancement sur le thème (travail en binômes)
- 14 jan 10:00-12:00 : CM n°5: Psychologie des émotions et informatique affective
- 21 jan 9:00-12:00 : Rendu final

Thèmes

- Voir année précédente: édition d'un livre
- <https://hal.archives-ouvertes.fr/cel-01110281>
 1. La Singularité technologique
 2. Ethique, responsabilité et statut juridique du robot compagnon: revue et perspectives
 3. Robot compagnon et fiction
 4. Contribution des robots sociaux aux thérapies des troubles du spectre autistique: une revue critique.
 5. Les Robots Compagnons pourront-ils se substituer aux animaux de compagnie?
 6. Incarnations des agents intelligents: un état des lieux
 7. Téléprésence télé-opérée: le cas du robot lycéen
 8. Les robots sociaux doivent-ils être humanoïdes
 9. Une Relation Homme-Robot à long-terme est-elle possible?

Thèmes (cnt.)

1. Comparaison personnages virtuels / robots
 - Zlotowski, J. (2010). "Comparison of Robots' and Embodied Conversational Agents' Impact on Users' Performance." MSc Thesis, University of Tampere. Department of Computer Sciences: 55 pages.
 - Holz, T., M. Dragone and G. M. P. O'Hare (2009). "Where Robots and Virtual Agents Meet: A Survey of Social Interaction Research across Milgram's Reality-Virtuality Continuum." International Journal of Social Robotics 1(1): 89-93.
2. Robots biomimétiques, humanoïdes – compliance
 - Higashimoto T, Sawada H. Vocalization control of a mechanical vocal system under the auditory feedback. *Journal of Robotics and Mechatronics*. 2002;14(5):453–461.
 - R. Hofe and R. K. Moore, “Anton: an animatronic model of a human tongue and vocal tract.” in INTERSPEECH, pp. 2647–2650, 2008.
3. Robots expressifs/émotionnels – gestes, expressions faciales...
 - I. Lutkebohle, F. Hegel, S. Schulz, M. Hackel, B. Wrede, S. Wachsmuth, and G. Sagerer, “The Bielefeld anthropomorphic robot head “Flobi”,” in Proc. IEEE Int. Conf. on Robotics and Automation (ICRA), pp. 3384–3391, IEEE, 2010.

Thèmes (cnt.)

4. Navigation sociale, sensible à l'humain/proxémie
 - Sisbot, Emrah Akin, Luis F. Marin-Urias, Rachid Alami, and Thierry Simeon. "A human-aware mobile robot motion planner." *Robotics, IEEE Transactions on* 23, no. 5 (2007): 874-883.
 - Vasquez, Dizan, Procópio Stein, Jorge Rios-Martinez, Arturo Escobedo, Anne Spalanzani, and Christian Laugier. "Human-aware navigation for assistive robotics." In *Experimental Robotics*, pp. 449-462. Springer International Publishing, 2013.
5. Le projet Geminoid/clonage
 - Dougherty, Elizabeth G., and Henrik Scharfe. "Initial formation of trust: designing an interaction with geminoid-dk to promote a positive attitude for cooperation." In *Social Robotics*, pp. 95-103. Springer Berlin Heidelberg, 2011.
 - Sakamoto, Daisuke, Takayuki Kanda, Tetsuo Ono, Hiroshi Ishiguro, and Norihiro Hagita. "Android as a telecommunication medium with a human-like presence." In *Human-Robot Interaction (HRI), 2007 2nd ACM/IEEE International Conference on*, pp. 193-200. IEEE, 2007.

Thèmes (cnt.)

6. Serrer la main à un robot – synchronisation fine d'activités
 - Chris Bevan and Danaë Stanton Fraser (2015) Shaking Hands and Cooperation in Tele-present Human-Robot Negotiation. HRI, 247-254
 - Jindai, Mitsuru; Ota, Shunsuke; Ikemoto, Yusuke; Sasaki, Tohru (2015) Handshake request motion model with an approaching human for a handshake robot system, in *Cybernetics and Intelligent Systems (CIS) and IEEE Conference on Robotics, Automation and Mechatronics (RAM)*, 265-270.
7. Marcher côte-à-côte
 - Hagita N. Luis Yoichi Morales, Satoru S., Huq R., Glas D, Kanda T. (2012) How Do People Walk Side-by-Side? - Using a Computational Model of Human Behavior for a Social Robot, HRI, 301-308.
 - Gockley, Rachel, Jodi Forlizzi, and Reid Simmons. "Natural person-following behavior for social robots." In *Proceedings of the ACM/IEEE international conference on Human-robot interaction*, pp. 17-24. ACM, 2007.
8. Robotique et interfaces cerveau-machine
 - Bell, Christian J., Pradeep Shenoy, Rawichote Chalodhorn, and Rajesh PN Rao. "Control of a humanoid robot by a non invasive brain-computer interface in humans." *Journal of neural engineering* 5, no. 2 (2008): 214.

Thèmes (cnt.)

9. Cobotique - collaboration humain/robot en milieu industriel
 - Claverie, B., Blanc, B. L., & Fouillat, P. (2014). La cobotique. *Communication & Organisation*, 44(2), 203-214.
 - Zhan, Y., Duan, X. G., & Li, J. X. (2015). Review of comanipulation robot in surgery. In IEEE Conf. on *Mechatronics and Automation (ICMA)*, 1466-1471.
10. Donner de la personnalité à un robot
 - Ludewig, Y., Döring, N., & Exner, N. (2012). Design and evaluation of the personality trait extraversion of a shopping robot. In *RO-MAN*, 372-379.
 - Hendriks, B., Meerbeek, B., Boess, S., Pauws, S., & Sonneveld, M. (2011). Robot vacuum cleaner personality and behavior. *International Journal of Social Robotics*, 3(2), 187-195.
11. Apprentissage développemental
 - Li, K., & Meng, M. Q. H. (2015). Learn Like Infants: A Strategy for Developmental Learning of Symbolic Skills Using Humanoid Robots. *International Journal of Social Robotics*, 1-12.
 - Oudeyer, P. Y. (2014). Developmental Learning of Sensorimotor Models for Control in Robotics. *SIAM News*, 47(7).

Thèmes (cnt.)

12. Interaction enfants-robots

- Short, E., Swift-Spong, K., Greczek, J., Ramachandran, A., Litoiu, A., Grigore, E. C. & Scassellati, B. (2014). How to train your dragonbot: Socially assistive robots for teaching children about nutrition through play. In *RO-MAN*, 924-929.
- Fink, J., Lemaignan, S., Dillenbourg, P., Réturnaz, P., Vaussard, F., Berthoud, A. & Franinović, K. (2014). Which robot behavior can motivate children to tidy up their toys?: Design and evaluation of ranger. In *ACM/IEEE international conference on Human-robot interaction*, 439-446.

13. Robots, art et culture

- Šabanović, S., Bennett, C. C., & Lee, H. R. (2014). Towards culturally robust robots: A critical social perspective on robotics and culture. In *Proc. HRI Workshop on Culture-Aware Robotics*.
- Xia, G., Tay, J., Dannenberg, R., & Veloso, M. (2012). Autonomous robot dancing driven by beats and emotions of music. In *Proceedings of the 11th International Conference on Autonomous Agents and Multiagent Systems*, 1, 205-212.
- Gemeinboeck, P., & Saunders, R. (2013). Creative machine performance: Computational creativity and robotic art. In *Proceedings of the 4th International Conference on Computational Creativity*.

Instructions pour rédaction (1)

- Style
 - IEEE: http://www.ieee.org/conferences_events/conferences/publishing/templates.html
 - A4
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 - Latex
 - Overleaf, sharelatex
 - Word
 - Microsoft wordonline

Instructions pour rédaction (2)

- Biblio

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A robust layered control system for a mobile robot
R Brooks - Robotics and Automation, IEEE Journal of, 1986 - ieexplore.ieee.org
Abstract—A new architecture for controlling mobile robots is described. Layers of control system are built to let the **robot** operate at increasing levels of competence. Layers are made up of asynchronous modules that communicate over low-bandwidth channels. Each ...
Cited by 9528 Related articles All 88 versions Cite Save

[CITATION] Computer and robot vision
RM Haralick, LG Shapiro - 1991 - dl.acm.org
This two-volume set is an authoritative, comprehensive, modern work on computer vision that covers all of the different areas of vision with a balanced and unified approach. The discussion in "Volume I" focuses on the basic concepts and methods of computer vision, while "Volume II" focuses on more advanced topics such as robotics, computer graphics, and machine learning.

[BOOK] Robot motion pl.
JC Latombe - 2012 - books.google.com
One of the ultimate goals in R high-level descriptions of task. The input descriptions will specify the desired behavior of the robot. The input descriptions will specify the desired behavior of the robot.

The development of H
K Hirai, M Hirose, Y Haikawa - 1986 - books.google.com
Abstract In this paper, we present a new approach to integrated, functional, and distributed control of mobile robots. The proposed approach is based on the concept of a layered control system, which consists of several layers of control modules operating at different levels of abstraction. The top layer is responsible for global planning and navigation, while the bottom layer is responsible for local control and sensor fusion. The middle layer is responsible for task planning and execution. The proposed approach is able to handle complex environments and multiple tasks simultaneously, and it is able to adapt to changes in the environment and task requirements.

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MLA Brooks, Rodney. "A robust layered control system for a mobile robot." *Robotics and Automation, IEEE Journal of* 2.1 (1986): 14-23.

APA Brooks, R. (1986). A robust layered control system for a mobile robot. *Robotics and Automation, IEEE Journal of*, 2(1), 14-23.

Chicago Brooks, Rodney. "A robust layered control system for a mobile robot." *Robotics and Automation, IEEE Journal of* 2, no. 1 (1986): 14-23.

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Instructions pour présentation

- Jury: G. Bailly, S. Pesty + enseignant spécialiste extérieur
- 3 heures: 12 groupes
 - Donc 15" par groupe: 10" exposé et 5" questions
- Complément au papier
 - Max 6 transparents: position du pb, état de l'art, synthèse et conclusions/perspectives
 - Finir par un transparent biblio: articles lus, sites consultés, etc
 - Reprends les éléments principaux
 - Illustrations (vidéos, graphiques, etc.)

