CYBER-PHYSICAL SYSTEMS

Source: Britannica Image Quest

A Cyber-Physical System (CPS) is an integrated networked 'intelligent' system comprising both the physical and computational components. These systems usually have scalable algorithms for analyzing real-time software and are adaptive and predictive. Common applications of CPS are sensor-based communication-enabled autonomous systems but other sophisticated types include smart grid, avionics, military applications, healthcare and transportation. This reading list contains over 30 articles and books published in the last 3 years.

The Library will periodically add new resources to this list. Links to the full text are indicated via the hyperlinks. If you encounter any problem in retrieving the materials, please contact library@sutd.edu.sg for assistance.

Please also forward us titles that you would like to share with others on the list.

Topics

Overview

Provide an introduction to the topics and concepts of Cyber-Physical Systems

Alur, R. (2015). Principles of Cyber-Physical Systems. Retrieved from http://www.jstor.org.library.sutd.edu.sg:2048/stable/j.ctt17kkb0d

Colombo, A., Bangemann, Thomas, & Karnouskos, Stamatis. (2014). Industrial Cloud-Based Cyber-Physical Systems The IMC-AESOP Approach. http://dx.doi.org/10.1007/978-3-319-05624-1

Hu, F. (2013). Cyber-Physical Systems. http://dx.doi.org.library.sutd.edu.sg:2048/10.1201/b15552

Pathan, A. (2015). Securing Cyber-Physical Systems. http://dx.doi.org.library.sutd.edu.sg:2048/10.1201/b19311

Selic, B., & Gérard, Sébastien. (2013). Modeling and Analysis of Real-Time and Embedded Systems with UML and MARTE Developing Cyber-Physical Systems (The MK/OMG Press). Retrieved from http://proquestcombo.safaribooksonline.com.library.sutd.edu.sg:2048/9780124166196

Siddesh, G. M. (2016). Cyber-physical systems: a computational perspective. http://dx.doi.org.library.sutd.edu.sg:2048/10.1201/b19206

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Automatic Pilot Avionics

Systems, Equipment and devices for controlling aircraft or spacecraft without constant human intervention

Bhatt, D., Schloegel, K., Madl, G., & Oglesby, D. (2013). Quantifying Error Propagation in Data Flow Models. 2013 20th Annual Ieee International Conference and Workshops on the Engineering of Computer Based Systems (Ecbs 2013), 2-11. http://dx.doi.org/10.1109/ecbs.2013.7

Cosse, R., Berdjag, D., Piechowiak, S., Duvivier, D., & Gaurel, C. (2015). Meta-Diagnosis for a Special Class of Cyber-Physical Systems: The Avionics Test Benches. In M. Ali, Y. S. Kwon, C. H. Lee, J. Kim & Y. Kim (Eds.), Current Approaches in Applied Artificial Intelligence (Vol. 9101, pp. 635-644). http://dx.doi.org/ 10.1007/978-3-319-19066-2_61

Zhang, L. C., & Ieee. (2014). Convergence Approach to Model Physical World and Cyber World of Aviation Cyber Physical System. 2014 IEEE 12th International Conference on Dependable, Autonomic and Secure Computing (DASC)/2014 IEEE 12th International Conference on Embedded Computing (EmbeddedCom)/2014 IEEE 12th International Conf on Pervasive Intelligence and Computing (PICom), 418-423. http://dx.doi.org/10.1109/dasc.2014.81

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Autonomous Automobile Systems

Self driving vehicles that are able to navigate through monitoring road conditions and sensing the environment

Amin, M., & Tariq, Z. (2015). Securing the Car: How Intrusive Manufacturer-Supplier Approaches Can Reduce Cybersecurity Vulnerabilities. Technology Innovation Management Review, 21-25. Retrieved from http://timreview.ca/article/863

Chakraborty, S., Al Faruque, M. A., Chang, W. L., Goswami, D., Wolf, M., & Zhu, Q. (2016). Automotive Cyber-Physical Systems: A Tutorial Introduction. Ieee Design & Test, 33(4), 92-108. http://dx.doi.org/10.1109/mdat.2016.2573598

Riaz, F., & Niazi, M. A. (2016). Road collisions avoidance using vehicular cyber-physical systems: a taxonomy and review. Complex Adaptive Systems Modeling, 4, 34. http://dx.doi.org/10.1186/s40294-016-0025-8

Shreejith, S., Fahmy, S. A., & Ieee. (2015). Security Aware Network Controllers for Next Generation Automotive Embedded Systems 2015 52nd Acm/Edac/Ieee Design Automation Conference. Los Alamitos: Ieee Computer Soc. http://dx.doi.org/10.1145/2744769.2744907

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Healthcare

Systems, Equipment and Devices for monitoring health, healthcare intuitions and services

Chen, M., Ma, Y. J., Song, J., Lai, C. F., & Hu, B. (2016). Smart Clothing: Connecting Human with Clouds and Big Data for Sustainable Health Monitoring. Mobile Networks & Applications, 21(5), 825-845. http://dx.doi.org/10.1007/s11036-016-0745-1

Chen, X., Wang, L. M., Ding, J., & Thomas, N. (2016). Patient Flow Scheduling and Capacity Planning in a Smart Hospital Environment. Ieee Access, 4, 135-148. http://dx.doi.org/10.1109/access.2015.2509013

Sakr, S., & Elgammal, A. (2016). Towards a Comprehensive Data Analytics Framework for Smart Healthcare Services. Big Data Research, 4, 44-58. http://dx.doi.org/10.1016/j.bdr.2016.05.002

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Maritime

Systems, Equipment and Devices for controlling ships or vessels without constant human intervention

Abdelaal, M., Fränzle, M., & Hahn, A. (2016). NMPC-based Trajectory Tracking and Collison Avoidance of Underactuated Vessels with Elliptical Ship Domain*. IFAC-PapersOnLine, 49(23), 22-27. http://dx.doi.org/10.1016/j.ifacol.2016.10.316

Johansen, T. A., Cristofaro, A., & Perez, T. (2016). Ship Collision Avoidance Using Scenario-Based Model Predictive Control*. IFAC-PapersOnLine, 49(23), 14-21. http://dx.doi.org/10.1016/j.ifacol.2016.10.315

Lesire, C., Infantes, G., Gateau, T., & Barbier, M. (2016). A distributed architecture for supervision of autonomous multi-robot missions. Autonomous Robots, 40(7), 1343-1362. http://dx.doi.org/10.1007/s10514-016-9603-z

Steinberg, M., Stack, J., & Paluszkiewicz, T. (2016). Long duration autonomy for maritime systems: challenges and opportunities. Autonomous Robots, 40(7), 1119-1122. http://dx.doi.org/10.1007/s10514-016-9582-0

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Military

Systems, Equipment and Devices for controlling missiles or unmanned aerial vehicles for defense purposes.

Holt, J., Biaz, S., Yilmaz, L., & Aji, C. A. (2014). A symbiotic simulation architecture for evaluating UAVs collision avoidance techniques. Journal of Simulation, 8(1), 64-75. http://dx.doi.org/10.1057/jos.2013.5

Lee, H. C., & Choi, J. W. (2005). Autopilot design for agile missile using LTV control and nonlinear dynamic inversion. IFAC Proceedings Volumes, 38(1), 205-210. http://dx.doi.org/10.3182/20050703-6-CZ-1902.01995

Lee, J., Lee, Y., Kim, Y., Moon, G., & Jun, B.-E. Design of an Adaptive Missile Autopilot Considering the Boost Phase Using the SDRE Method and Neural Networks. Journal of the Franklin Institute. http://dx.doi.org/10.1016/j.jfranklin.2016.12.004

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Smart Grid

An evolved electrical grid system (comprises of smart monitoring meters, appliances and devices) that manages electricity demand in a sustainable, reliable and economic manner.

Bayindir, R., Colak, I., Fulli, G., & Demirtas, K. (2016). Smart grid technologies and applications. Renewable and Sustainable Energy Reviews, 66, 499-516. http://dx.doi.org/10.1016/j.rser.2016.08.002

Dimitriou, T., & Awad, M. K. (2016). Secure and scalable aggregation in the smart grid resilient against malicious entities. Ad Hoc Networks, 50, 58-67. http://dx.doi.org/10.1016/j.adhoc.2016.06.014

Lund, H., Werner, S., Wiltshire, R., Svendsen, S., Thorsen, J. E., Hvelplund, F., & Mathiesen, B. V. (2014). 4th Generation District Heating (4GDH) Integrating smart thermal grids into future sustainable energy systems. Energy, 68, 1-11. http://dx.doi.org/10.1016/j.energy.2014.02.089

Saraiva, F. d. O., Bernardes, W. M. S., & Asada, E. N. (2015). A framework for classification of non-linear loads in smart grids using Artificial Neural Networks and Multi-Agent Systems. Neurocomputing, 170, 328-338. http://dx.doi.org/10.1016/j.neucom.2015.02.090

Zakeri, B., & Syri, S. (2015). Electrical energy storage systems: A comparative life cycle cost analysis. Renewable and Sustainable Energy Reviews, 42, 569-596. http://dx.doi.org/10.1016/j.rser.2014.10.011

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Water Safety Monitoring

Systems, Equipment and devices for monitoring potable water and water distribution systems

Aydin, N. Y., Zeckzer, D., Hagen, H., & Schmitt, T. (2015). A decision support system for the technical sustainability assessment of water distribution systems. Environmental Modelling & Software, 67, 31-42. http://dx.doi.org/10.1016/j.envsoft.2015.01.006

Behmel, S., Damour, M., Ludwig, R., & Rodriguez, M. J. (2016). Water quality monitoring strategies — A review and future perspectives. Science of The Total Environment, 571, 1312-1329. http://dx.doi.org/10.1016/j.scitotenv.2016.06.235

Imen, S., & Chang, N. B. (2016, 28-30 April 2016). Developing a cyber-physical system for smart and sustainable drinking water infrastructure management. Paper presented at the 2016 IEEE 13th International Conference on Networking, Sensing, and Control (ICNSC). http://dx.doi.org/ 10.1109/ICNSC.2016.7478983

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