Abstract

To incorporate the computation and communication with the physical world, next generation architecture i.e. CPS is viewed as a new technology. To improve the better interaction with the physical world or to perk up the electricity delivery usage, various CPS based approaches have been introduced. Recently several GPS equipped smart phones and sensor based frameworks have been proposed which provide various services i.e. environment estimation, road safety improvement but encounter certain limitations like elevated energy consumption and high computation cost. To meet the high reliability and safety requirements, this paper introduces a novel approach based on QCPS model which provides several users services (discussed in this
paper). Further, this paper proposed a Transport Information System (TIS), which provide the communication with lower cost overhead by arranging the similar sensors in the form of grids. Each grid has a coordinator which interacts with cloud to process the user query. In order to evaluate the performance of proposed approach we have implemented a test bed of 16 wireless sensor nodes and have shown the performance in terms of computation and communication cost.

References

- Singh, Jaipal, and Omar Hussain, 2012, Cyber-Physical Systems as an Enabler for Next Generation Applications, In Network-Based Information Systems (NBiS), 2012 15th IEEE International Conference on, pp. 417-422.
- Mundra Ankit, Bhagvan K. Gupta, Geetanjali Rathee, Meenu Chawla, Nitin Rakesh, and Vipin Tyagi, Validated Real Time Middle Ware For Distributed Cyber Physical Systems Using HMM, arXiv preprint arXiv:1304.3396 (2013).
- Jin Wang, Hassan Abid, Sungyoung Lee, Lei Shu, Feng Xia, 2011, A Secured Health Care Application Architecture for Cyber-Physical Systems, Vol. 13, No. 3, pp. 101-108.
- W. Jones, 2001, Forecasting traffic flow, IEEE Spectrum, Vol. 38, No. 1, pp. 90–91.
- Li, Xu, Chunming Qiao, Yunfei Hou, Yunjie Zhao, Aditya Wagh, Adel Sadek, Liusheng Huang, and Hongli Xu, 2013, On-road ads delivery scheduling and bandwidth allocation in vehicular CPS, In INFOCOM, 2013 Proceedings IEEE, pp. 2571-2579.
- Thiagarajan, Arvind, Lenin Ravindranath, Katrina LaCurts, Samuel Madden, Hari Balakrishnan, Sivan Toledo, and Jakob Eriksson, 2009, VTrack: accurate, energy-aware road traffic delay estimation using mobile phones, In Proceedings of the 7th ACM Conference on Embedded Networked Sensor Systems, pp. 85-98. ACM, 2009.
- Mundra, Ankit, Nitin Rakesh, and Vipin Tyagi. "Query Centric CPS (QCPS) Approach for Multiple Heterogeneous Systems." arXiv preprint arXiv:1306.6397 (2013).
- Yuan He, 2012, COSE: A Query-Centric Framework of Collaborative Heterogeneous Sensor Networks, IEEE transactions on parallel and distributed systems, Vol. 23, No. 9, pp. 1681-1693.
- Work, D. , and A. Bayen, 2008, Impacts of the mobile internet on transportation cyberphysical systems: traffic monitoring using smartphones, In National Workshop for Research on High-Confidence Transportation Cyber-Physical Systems: Automotive, Aviation, & Rail, pp. 18-20.
- Zhou, Jianhe, Chungui Li, and Zengfang Zhang, 2011, Intelligent transportation system based on SIP/ZigBee architecture. In Image Analysis and Signal Processing (IASP), 2011 IEEE International Conference on, pp. 405-409.
- Li, Xu, Wei Shu, Ming-Lu Li, and Min-You Wu, 2008, Vehicle-based Sensor Networks for Traffic Monitoring. In Proc. of 17th IEEE International Conference on Computer Communications and Networks.

Index Terms

Computer Science

Networks
Keywords
QCPS; Heterogamous sensor networks; Cyber Physical Systems; Transport;