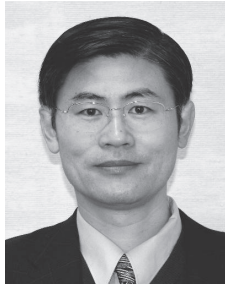


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Refereed Journal Papers

- [z-cheng-01:2013] Z Cheng et al. L. Jing, Y. Zhou. Context-Aware Service Roaming for Heterogeneous Embedded Devices over Cloud. *Journal of Systems Architecture (JSA)*, 59(3):776–784, 2013.

Cloud computing advocates a promising paradigm that facilitates the access within heterogeneous services, platforms, and end users. However, platforms (or host servers) have confined to devices which require a considerable computing resources. In this case, solutions concerning the efficient use of pervasive devices with constrained resources become an open issue. This study investigates the seamless connection between embedded devices and cloud resources to enhance the capability of computing and furthermore provide context-aware services. A method for wireless program dissemination and boot loading is proposed to transfer necessary information and resources between service and target device(s). The experiment results on time delay and energy cost demonstrate the feasibility and performance.

- [z-cheng-02:2013] L. Jing, Z. Cheng, and S. Kimura. A Hybrid MAC Layer Protocol to Trade-off between Maximum Delay and Energy Efficiency for Wireless Home Automation Networks. *Journal of Convergence Information Technology (JCIT)*, 8(2):777–785, 2013.

Wireless Home Automation Networks (WHAN) directly interacts with people when they need to control the household appliances or telecommunicate with others. Therefore, the delay and energy are two main issues to be approached for a WHAN. In this paper, we propose UA-MAC, a user adaptive MAC protocol for WHAN to take tradeoff between energy consumption and user tolerable end-to-end delay. At first, a probability-based method is adopted to find out the relationship between collision rate and number of users. Then, a user adaptive distributed algorithm by adjustment of active window is presented, which can adjust the window size according to the number of users and collision rate. Moreover, a hybrid media access protocol combining with contention-based (Aloha-like) and contention-free (TDMA-like) method is adopted. When there is little collision, the active window is set to a small period and a pure ALOHA protocol is used for saving the energy. When collision rate is increased, active window will be enlarged and contention free transmission is employed to guarantee tolerable end-to-end delay. The simulation results show that the rate of collision can be controlled, though the number

of users is increased, and end-to-end delay can be controlled within three beacon intervals even in the worst case, which is hard to be realized in existing protocols.

Refereed Proceeding Papers

- [aiguo-01:2013] Takenobu Kazuma Ryota Nagayama, Takuya Endo and Aiguo He. A Basic Study of Human Face Direction Estimation Using Depth Sensor. In *Proceedings of the 2013 International Joint Conference on Awareness Science and Technology & Ubi-Media Computing (iCAST 2013 & UMEDIA 2013)*, pages 644 – 648. IEEE, Nov. 2013.

Kinect is a popular edition of depth sensor and is useful for realizing NUI in ubiquitous computing environment. This paper proposes a method for human face direction estimation based on the depth image from depth sensor. Our method works without using color information and is possible to work in dark environment and get better results than traditional methods. This paper describes the basic idea and basic design of our method.

- [z-cheng-03:2013] T. Huang P. Li N. Yen J. Tsai Y. Zhou L. Jing Z. Cheng, J. Wang. A Situation-Oriented IoT Middleware for Resolution of Conflict Contexts Based on Combination of Priorities. In *Proc. of EMC-13(The 8th International Conference on Embedded and Multimedia Computing)*, pages – . , , Aug. 2013.

Situation-aware service is recognized as an emerging research issue in ubiquitous computing. It becomes more important and significant with the recent progress in IoT (Internet of Things), since the situations considered in IoT are more complex, become global, and cause more conflict. In this paper, a middleware for management conflict situations was designed, to prompt the development of context-aware services. It is characterized by its ability of situation-oriented, paying attention to relations among users (and situations as well) and smart objects around. Eventually, following issues were solved: (a) a method for detecting (i.e., being aware of) a specific situation, and triggering corresponding service; and (b) an algorithm for conflict situations/context management. A diagram of situation state transition (DSST) was proposed to specify states of a situation. A set of situation-oriented ECA rules are presented

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to reason the situations' states based on sensed data. Policies based on DSST for resolving conflicts were also given. The experiment results demonstrate the feasibility of proposed method, and the performance of proposed situation-oriented policies.

- [z-cheng-04:2013] Zixue Cheng et al Junbo Wang, Kazuhiro Matsumoto. A Location Optimazition Method Based on Communication Requirements to Reconnect Seperated Communication Areas after a Disaster. In *Proc. of the 2013 IEEE International Conference on Internet of Things*, pages 653–657, 2013.

Smartphones and other portable devices are now spreading rapidly and widely, and many different wireless network technologies are available on those devices. Meanwhile, although communication systems such as twitter or e-mail is useful to share information of safety, in a period after happening of a disaster, general communication systems may not available due to the destruction or limited usage of communication infrastructure. The MANET is one such kind of technology to be used for sharing safety information at that time. However, the communication network based MANET is very easily to be separated due to destroy of some building or movement of some relay nodes. In this paper, we tackle the above research problem to find optimal positions to deploy nodes and reconnect the network. To achieve that, we should focus on the following two aspects. One is how to detect the separated areas after disaster. Another is how to find optimal positions of mobile routers to quickly and efficiently reconnect the separated communication area. To this end, we propose a location optimization method based on communication requirement to reconnect separated communication areas after a disaster. It mainly consists of two algorithms to solve the above problems respectively. The simulation result has shown feasibility of the method proposed in the paper.

- [z-cheng-05:2013] Peng Li et al. Junbo Wang, Zixue Cheng. Design of a Best Load Balancing Method for Anti-Disaster Mobile Mesh Communication Networks. In *Proc. of 2013 IEEE Second International Conference on Mobile Services*, pages 64–69, 2013.

After happening of a disaster, general communication systems, e.g., cell-phone, usually are not available, as Great East Japan Earthquake happened in Japan, due to destroy or limited usage of base stations. To quickly reconstruct a communication system for safety confirmation and transferring important information, e.g., food and medicine information,

Summary of Achievement

many researches have been performed. One of hottest topic is mobile mesh communication system, by quickly setting some special wireless mesh routers in the disaster area and let users communicate each other. However, how to effectively locate and use the mobile mesh routers to construct a communication system is a key research problem, due to the following features after happening of a disaster, (1) unbalanced distribution of crowd, (2) limited communication resources, (3) different users' demand on communication throughput. In the paper, to solve the above problems, we propose a best load balancing method for anti-disaster mobile mesh communication systems. The basic ideas of the method are that, (1) first quickly putting some special mobile mesh routers in a disaster area to construct a communication system after happening of a disaster, (2) gradually find the best location and work scope of mobile mesh router (MMR) to let all MMRs work effectively. Finally, we have shown the feasibility research of the proposed method in Matlab.