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EDITORIAL

IEEE ACCESS SPECIAL SECTION EDITORIAL: PROXIMITY SERVICE (PROSE) CHALLENGES AND APPLICATIONS

The mobile revolution is changing the way we interact with the people and things around us. Proximity awareness, the ability to actively/passively and continuously search for relevant value in one's physical/virtual proximity, is at the core of this phenomenon.

In general, Proximity Service (ProSe) can be composed of two main groups of use cases: public safety communications and discovery mode (commercial applications). On the one hand, the ability to support direct communication is a core requirement for public safety use cases when the devices are in proximity and the network is down, or when the device is out of coverage (e.g., in the situations of disaster rescue), as it may take too much time to install new communication equipment and restore damage infrastructure. On the other hand, much more than just a "friend finder," commercial discovery mode could establish a paradigm shift from the Personal Computer (PC) "search-to-discover" mindset to always-on discovery services that are fundamental to defining the next-generation of mobile service.

In addition to the underlying enabling novel technologies, the latest application and research results of ProSe in academic fields, industrial fields, and standardization should be analyzed and designed. In brief, this Special Section solicits works to comprehensively present architecture, fundamental issues, and applications in ProSe networking environment from interdisciplinary viewpoints. After a rigorous peer-review process, a total of 21 articles were accepted.

In the article "Neutralizing BLE beacon-based electronic attendance system using signal imitation attack," by Kim *et al.*, the authors analyzed the weaknesses of BLE beacon-based electronic attendance system (BEAS) and presented possible counter-measures.

In the article "Robust beamforming design for secure DM-based relay networks with self-sustained jammers," by Zhou *et al.*, the authors proposed to use self-sustained jammers to generate artificial noise with the aim of enhancing the physical layer security of a directional modulation (DM) relay system.

In the article "Legitimate monitoring via cooperative relay and proactive jamming," by Zhu *et al.*, the authors proposed a wireless communication system using two legitimate monitors for a cooperative monitoring program in which the signals sent by two monitors are, respectively, designed with the objective of obtaining the maximum eavesdropping rate.

In the article "Clone detection based on physical layer reputation for proximity service," by Pan *et al.*, the authors elaborated the physical layer reputation based clone detection protocol to detect clone attacks in multiple scenarios. Simulations and realizations demonstrated that the proposed protocol significantly improves the detection rate and false alarm rate.

In the article "Complex attack linkage decision-making in edge computing networks," by Li *et al.*, the authors proposed an attack linkage disposal decision-making method for edge computing network systems based on attribute attack graphs to solve the linkage disposal and minimum cost response of complex attacks.

In the article "An effective identification technology for online news comment spammers in Internet media," by Si *et al.*, the authors proposed an effective technology for identifying online news comment spammers based on the label propagation algorithm (LPA), making full use of user comment behaviors and contents.

In the article "FMCNN: A factorization machine combined neural network for driving safety prediction in vehicular communication," by Zhao *et al.*, the authors designed the factorization machine combined neural network (FMCNN) to predict the driving safety in vehicular communication, in which the factorization machine and the deep neural networks were used to learn the effects of low-order and high-order feature interactions from driving information and weather information in the pretraining phase, respectively.

In the article "Latency analysis of wireless networks for proximity services in smart home and building automation: The case of thread," by Lan *et al.*, the authors presented a system level model of latency in the thread mesh network, in which the accumulated latency consists of different kinds of delay from the application layer to the physical layer. The system level model was experimentally validated in a multihop thread mesh network.

In the article "cGAN-based facial expression recognition for human-robot interaction," by Deng *et al.*, the authors presented a conditional generative adversarial network-based approach to alleviate intra-class variations by individually controlling facial expressions and learning generative and discriminative representations simultaneously.

In the article "SmartWAZ: Design and implementation of a smart WiFi access system assisted by Zigbee," by

Zhang *et al.*, the authors deeply investigate the application of wireless cross-technology communication (CTC) into smart and energy-effective WiFi access with the assistance of a low-power radio. Specifically, a smartWiFi access system assisted by Zigbee, SmartWAZ, was designed for mobile terminals with both WiFi and Zigbee interfaces.

In the article “Novel RPSO-based strategy for optimizing the placement and charging of a large-scale camera network in proximity service,” by Wang *et al.*, the authors addressed the coverage optimization problems and charging problems of camera networks with mobile nodes based on resampling particle swarm optimization (RPSO).

In the article “Hypergraph matching with an entropy barrier function,” by Zhu *et al.*, the authors proposed a hypergraph matching model with an entropy barrier function considering the discrete property of the assignment matrix, and solved the model with a nonmonotone active set projected Newton method.

In the article “RMapTAFE: Radio map construction based on trajectory adjustment and fingerprint amendment,” by Li *et al.*, the authors presented the RMapTAFE scheme to construct a radio map from pedestrian trajectories, which first proposed a novel sample-fingerprint structure, and then proposed a trajectory adjustment algorithm via selective particle filtering.

In the article “Enhancing localization of mobile robots in distributed sensor environments for reliable proximity service applications,” by Bai *et al.*, the authors proposed an improved Unscented Kalman Filter-Based Localization algorithm to reduce the impacts of packet loss in the localization process. Rather than ignoring the missing measurements caused by packet loss, the proposed algorithm exploited the calculated measurement errors to estimate and compensate for the missing measurements.

In the article “Trusted K nearest Bayesian estimation for indoor positioning system,” by Yadav *et al.*, the authors introduced a novel positioning system with inertial measurement unit (IMU) sensors and Bluetooth low-energy (BLE) beacon for a smartphone.

In the article “Improving indoor fingerprinting positioning with affinity propagation clustering and weighted centroid fingerprint,” by Subedi *et al.*, the authors proposed an improved two-step fingerprinting localization using multiple fingerprint features to enhance the localization accuracy, which used a propagation model to convert RSS of beacons to distance and estimated the weighted centroid (WC) of nearby beacons.

In the article “Design of software-defined radios based platform for activity recognition,” by Khan *et al.*, the authors designed a software-defined radio platform for the detection of human activity. Extensive experiments were performed in a laboratory environment by using two Universal Software Radio Peripheral (USRP) to extract the wireless channel state information (WCSI).

In the article “Efficient spectrum management techniques for cognitive radio networks for proximity service,”

by Nandakumar *et al.*, the authors proposed an improved adaptive energy detection technique to improve spectrum efficiency. Moreover, for spectrum handoff, the concept of multiple attributes for decision-making was implemented.

In the article “Interest broadcast suppression scheme for named data wireless sensor networks,” by Bouk *et al.*, the authors proposed an interest broadcast suppression scheme that considers interest holding time using the distance between forwarder and receiver of the interest, energy, angle, and distance from the beeline between the consumer and the spatial region, to avoid broadcasting of unnecessary copies of Interest.

In the article “Stochastic computation offloading and scheduling based on mobile edge computing,” by Zheng *et al.*, the authors investigated computation offloading involving multiple users and multiple base stations (BSs), which models the process of solving an optimal computation offloading policy into Markov decision process (MDP), with the goal of maximizing the long-term utility performance.

In the article “Design and analysis of an effective two-step clustering scheme to optimize prefetch cache technology,” by Zhang *et al.*, the authors explored an effective two-step clustering scheme to implement for the optimization of the prefetch cache strategy, which can avoid the cache being cleared prematurely and increase the probability of cache hits.

In conclusion, we would like to thank all the authors who submitted their research articles to our Special Section. We highly appreciate the contributions of the reviewers for their constructive comments and suggestions. We also would like to acknowledge the guidance from the Editor-in-Chief and staff members.

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