

ePet: A Physical Game Based on Wireless Sensor Networks

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This paper describes ePet, a novel multi-player physical game based on the WSN (Wireless Sensor Network). ePet shifts the traditional virtual pet games to the real world, featuring with the popular RPG (Role-Playing Game) elements. The game, capitalizing on the wireless communication, mobile computing, and sensing ability, can be played both indoors and outdoors, and thus gives players a new exciting gaming experience that profits by the blend of real and virtual game elements.

The physical game acquires physical interactions among players, which can bring exciting and novel features to the game and more importantly, avoids some problems caused by traditional computer games such as health problems. The WSN is a promising technology for developing physical games. Although there is already some research and applications of WSN based physical games, the major advantages of the WSN (e.g. wireless communication, mobile computing, and sensing ability) are not fully cultivated in these gaming applications.

ePet, which takes good advantages of both the WSN and traditional computer games, simulates a pet both indoors and outdoors. The pet has two life modes: Peaceful Life Mode (PLM) and Aggressive Life Mode (ALM). In the PLM, ePet simulates the physiological activities of a real pet such as hunger and easily getting flu when it is cold in the real world. Moreover, the pet can date with other pets to increase its physiological values. In the ALM, the pet is a character of an RPG controlled by the player and the pet can have a fight with other pets, from which the pet gains experience for level up. This ALM is similar to the computer RPG games but relatively novel in WSN based games. All of the above features are enabled by the WSN technology. For the two life modes, a friend-making protocol and an RPG battle protocol are designed respectively. The architecture design and implementation of ePet are described in detailed. Unlike traditional WSN based games, ePet does not need a centralized base station to organize the network. To implement a self-adaptive wireless sensor network in which each node has a similar functionality, and solve the network conflict problems in the WSN communications, a multi-hop communication routing protocol is designed for ePet. Furthermore, a PC application was developed as the game interface, from which players can check out the ePet's properties and interact with ePet. It makes ePet more attractive than traditional WSN based games without losing WSN's advantages.

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