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PERSONS AND OBJECT TRACKING THROUGH PASSIVE TAGS

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ABSTRACT: Efficient and accurate tracking of device-free objects is critical for anti-intrusion systems. Prior solutions for device-free object tracking are mainly based on costly sensing infrastructures, resulting in barriers to practical applications. In this paper, we propose an accurate and efficient person and object detection system, to track device-free objects based on cheap passive RFID tags. This is the RFID system that can estimate the authorized and unauthorized person's and as well objects as well as the current location of a device-free object by measuring critical power variation sequences of passive tags. Compared with previous solutions, the unique advantage of this sytem, enables object tracking using a much sparser tag deployment. We contribute to both theory and practice of this phenomenon by presenting the interference model that precisely explains it and using extensive experiments to validate it. We design a practical RFID Tracking system based intrusion detection system and implement a prototype by commercial off-the-shelf (COTS) RFID reader and tags. The realworld experiments results show that this is effective in tracking the trajectory of moving object various environments.

Keywords: LPC2148 development board, RFID Module, Smart phone, Bluetooth.

INTRODUCTION: Wireless sensing systems have been serving as a core component of critical infrastructures and industrial control systems recently. Typically, they are built upon sensors and control units for control and protection of a physical infrastructure. Real-time sensing plays an important role in combining the computational and physical worlds together for these industrial applications. One of the fundamental tasks of a wireless sensing system is to detect and track intruders to ensure the safety of lives and properties. Since intruders are uncooperative objects, they are impossible to be bound with specific devices. Therefore detection of device-free intruders is a core requirement of an automatic anti-intrusion system. Specific sensing devices, such as the passive infrared (PIR) sensors, sonic sensors, and video camera sensors have been used for device-free motion detection and tracking. However, these solutions incur significant cost concerns. Recently, Radio Frequency Identification (RFID) has become a promising technique for device-free intrusion detection. An RFID reader may observe and analyze signal

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changes of pre-deployed tags to infer the motion of an intruder. RFID based motion detection is an attractive solution due to the convenient and cost-efficient deployment of RFID tags in physical environments. In fact, RFID tags have been widely applied to identification and monitoring tasks in industrial control systems for applications already,including logistics, inventory, and retailing. Reusing the existing RFID infrastructure further saves the cost of a real-time motion detection system. However, existing RFID-based motion detection methods in the are mostly based on active tags, which are less ubiquitous and much more expensive than passive tags. Existing passive tag based motion detection methods are device-based and not suitable for intrusion detection. Meanwhile, many of them require customized devices. To the best of our knowledge, the most recent device-free object tracking system using passive tags is Twins. The ideas of Twins are derived from the following observation. The mutual interference between two physical immediate readable tags caused by coupling effect will make one or both of them unreadable, which is called the critical state. The two coupled tags are named twins. If one object moves around the twins, it will cause extra RF wave reflection to the tags such that unreadable tags may accumulate sufficient power, and thus be able to backscatter their responses. In this way, the Twins system can report a nearby motion via the state shift from unreadable to readable. In this work, we present an accurate and Efficient Motion Detection System for device-free objects using an infrastructure constructed by passive tags.

SYSTEM DESIGN: The design of entire system consisted of two part which are hardware and software. The hardware is designed by the rules of embedded system, and the steps of software consisted. In Hardware part we are having two sections one is Tracking system and another one is monitoring section. These two sections are communicated by using Bluetooth based wireless technology. Tracking section: Fig1 shows the Hardware of the Tracking section it consists of Microcontroller, Bluetooth, and RFID and LCD modules. In this RFID module reads the persons and objects location details those information will be send to the monitoring section by using Bluetooth Technology.

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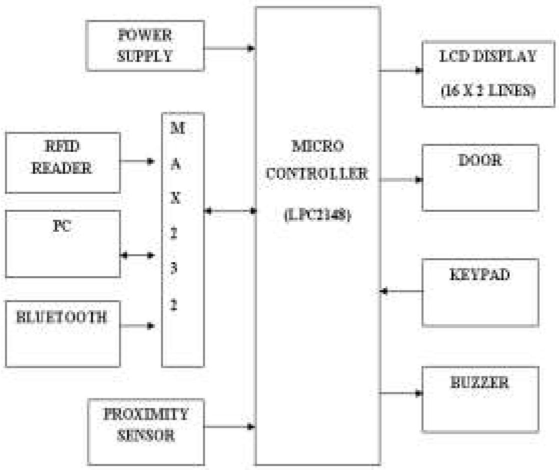

Fig1: Tracking section

Monitoring section: Fig2 shows the monitoring section it consists of Android mobile phone or laptop. In this Bluetooth Received the data from the tracking section that information will be displayed on the application

Fig2: Monitoring section

ARM7 (LPC2148) The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with embedded high-speed flash memory ranging from 32kB to 512 kB. The LPC2141/42/44/46/48microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with embedded high-speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32bit code execution at maximum clock

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rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2Cbus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

BLUETOOTH: AUBTM-22 is a Bluetooth v1.2 module with SPP profiles. The module is intended to be integrated into another host system which requires Bluetooth functions. The HOST system could send commands to AUBTM-22 through a UART. AUBTM-22 will parse the commands and execute proper functions, e.g. set the maximum transmit power, change the name of the module. And next the module can transmit the data receive from the UART with SPP profiles.

PROXIMITY SENSORA proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact's proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

RFID: Radio Frequency Identification (RFID) is a silicon chip-based transponder that communicates via radio waves. Radio Frequency Identification is a technology which uses tags as a component in an integrated supply chain solution set that will evolve over the next several years. RFID tags contain a chip which holds an electronic product code (EPC) number that points to additional data detailing the contents of the package. Readers identify the EPC numbers at a distance, without line-of-sight scanning or involving physical contact. Middleware can perform initial filtering on data from the readers. Applications are evolving to comply with shipping products to automatically processing transactions based on RFID technology RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used & supported by our Reader is 125 KHz.

Tags are classified into two types based on operating power supply fed to it. 1. Active Tags 2. Passive Tags Active Tags: These tags have integrated batteries for powering the chip. Active Tags are powered by batteries and either have to be recharged, have their batteries replaced or be disposed of when the batteries fail. Passive Tags: Passive tags are the tags that do not have batteries and have indefinite life expectancies.

CONCLUSION

In this paper, we propose a device-free object tracking scheme, Twins. We contribute to both the theory and practice of a new observed phenomenon, i.e., critical state on two adjacent tags. We also design a practical tracking method using passive tags. The extensive real experiments demonstrate the effectiveness of our method. Our future work includes studying critical state on a single tag, utilizing Twins to track multiple objects, and extending the detection region by refining the tracking algorithms.

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