

AN UN-HACKABLE SECURITY BASED SOFTWARE DEFINED RADIO USING WIRELESS TRANSCEIVER

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Abstract - In this paper, we present a novel defence scheme for SDR to avoid the configuration parameters being tampered by malicious software, even if the operating system is comprised. Three manipulation attacks of radio parameters are considered. We proposed and developed a module called Security Monitor which is deployed below the operating system (OS) level and above the hardware level, to monitor and verify the configuration parameters. This paper also provides a comparison between different types of frequency band systems developed using SDR and their performance analysis is also provided. However, the position estimation accuracy largely depends on the discrepancy of the path loss exponent. To improve the accuracy, the proposed method introduces a new process for the path loss exponent estimation when calculating the position and transmission power of unknown devices by the security monitor. The simulation results show that the proposed method has better position estimation accuracy compared with existing ones.

Key Words: Position estimation, RSS, SDR, transmission power estimation, path loss exponent

1. INTRODUCTION

Recently, our society is filled with various things equipped with wireless devices all around us. These things include not only mobile devices, wireless sensors and Internet of Things devices, but also unmanned aerial vehicle, self-driving car, unmanned robot, etc. Some of them may cause malfunction or erroneous operation, which may be malicious or harmful to other users. Hence, many researches have been achieved on the position and transmission power estimation of wireless devices for security, safety, sensor networks and cognitive radio network. To detect things around us, one of the common ways is a wideband spectrum sensing by software defined radio (SDR) due to its low implementation and computational complexity. The SDR receivers can perform spectrum sensing over a wide frequency range and measure the received signal strength (RSS) of a received signal by using software modifications. The position of a device and its transmission power can be obtained from a set of RSSs of nodes with known position. RSS based techniques are very attractive from a practical point of view because

these techniques are available in most wireless transceiver without any additional features. However, it is known that RSS is very sensitive to the path loss exponent (PLE), shading and fading parameter depending on field environment.

1.1 SDR

Software-defined radio (SDR) enables the flexible and efficient use of spectrum, which is a key technology to maintain a high quality wireless services. It also implement most radio functions in software and allow radios to become more flexible; new standards can be implemented by applying software updates to the radio hardware. With more powerful computer hardware and software, SDR endlessly continues to grow, and its continuing development requires contributions of computer engineers as well as software developers and communications engineers.

1.2 EXISTING SYSTEM

A general architecture of position estimation systems, which consists of multiple SDR receivers, networks and advice detection system. The device detection system then performs spectrum sensing, selects the frequency band of an unknown device, and calculates its locates the position of the unknown devices, calculates its transmission power considering the PLE in the field environment and marks the position on the map.

DRAWBACKS

- The output of the measurement will not be accuracy.
- Many existing works mentioned in strive to optimize heading estimation based on the data solely from low-cost sensors.

1.3 PROPOSED METHOD

We use a middleware called Security Monitor (SM) to separate the RA and ROE from the untrusted user application. It sends and receive the data through the Zigbee

module, and measures the time duration of transmission. The proposed algorithm can find the nearest position of the device under RSS measurement errors. The Proposed method introduces a new process for PLE estimation. By adopting the process, it can estimate the Optimum position of a device and its transmission power. The proposed method has better accuracy compared with existing ones.

ADVANTAGES

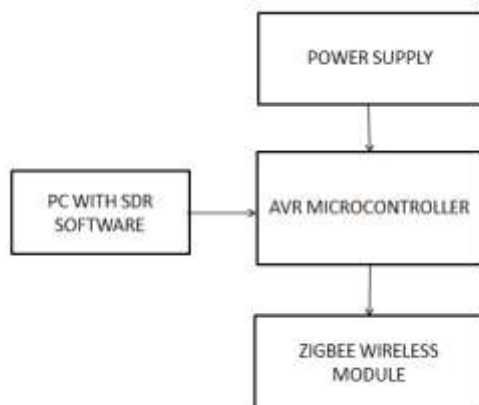
- Low-cost, fast and efficient data collection.
- Distribution automation.
- Ease of design.
- Multimode operation.

2. LITERATURE SURVEY

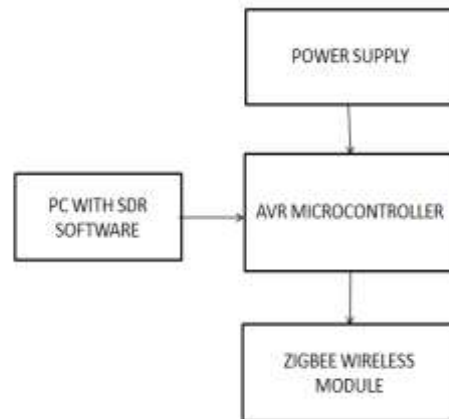
we present a novel defense scheme for SDR to avoid the configuration parameters being tampered by malicious software, even if the operating system is comprised Security Mechanisms to Defund against New Attacks on Software-Defined Radio in 2018. This provides a detailed analysis of SDR based radio receivers that can be implemented by using SDR systems. Software Defined radio Based Receivers Using It is based on the Security Mechanisms to Defund against New Attacks on Software-Defined Radio, Software Defined radio Based Receivers Using RTL- SDR and A Review and Evaluation of platforms and frameworks for high performance embedded Software Defined Radios.

3. BLOCK DIAGRAM

NODE1:



NODE 2:



3.1 POWER SUPPLY

A power supply is a device that supplies electrical or other types of energy to an output load. The transformer steps down the input line voltage and isolates the power supply from a power line. The Rectifier section converts the alternating current into a pulsating direct current. A filter section is used to convert pulsating dc to a more desirable form of dc voltage. Regulator maintains the output at a constant level.

3.2 AVR MICROCONTROLLER

AVR microcontroller uses on-chip flash memory for program storage. It use reset line to enter programming mode. It use 40 pin DIP package including multiplexed address and databus.

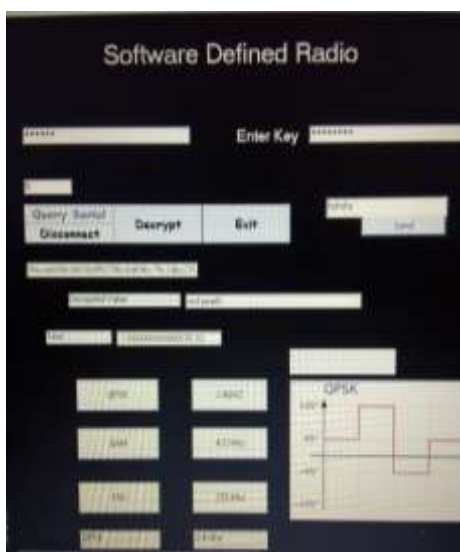


3.3 ZIGBEE WIRELESS MODULE

ZigBee is the most popular wireless mesh networking standard for connecting sensors, instrumentation and control systems. A specification for communication in a wireless personal area network (WPAN), has been called the "Internet of things." It is an open, global, packet-based protocol designed to provide secure, reliable, low power wireless networks. These are low data rate wireless networking standards that can eliminate the costly and damage prone wiring in industrial control applications.



4. RESULT



5. CONCLUSIONS

This paper has described an efficient detection method for unknown wireless devices using software defined Radio (SDR) receivers, which is to estimate the position and transmission power of unknown devices for security, safety and SDR networks.

The position detection system firstly senses the carrier frequency of unknown devices over a wide frequency range using SDR applications, estimates the position and transmission power of the device and shows the devices on the map. The RSS-based positioning techniques are sensitive to the value of the PLE. To mitigate position estimation errors caused by the PLE error, the proposed method introduces a new process for PLE estimation. By adopting the process, it can estimate the optimum position of a device and its transmission power.

The position estimation errors of the method are examined through computer simulation. Simulation results are shown that the method can estimate the position of a device under simplified propagation model without RSS errors.

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