Chapter 3
Sustainable Computing-Based Simulation of Intelligent Border Surveillance Using Mobile WSN

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ABSTRACT

This chapter has simulated and designed the intrusion detection and border surveillance system using mobile WSN technology. Due to increased terrorism globally, border protection has become a crucial issue in every country. Conventionally in border protection, a troop cannot provide security all over time. The authors have simulated the design of border protection by using mobile WSN technology on a CupCarbon simulator tool. They have analyzed the scenario of the smart city. So, a troop can be intimated with intrusions occurring on the border. They have created the authentication protocol for the better security of the application. The security protocol is necessary because the soldier's mobile device can be stolen during the war. It can be going into the hands of the enemy in the situation when troops expire. The Android app can guide the troop in the time of emergency and what the next step should be followed. The authors can check the status of the sensors deployed on the border. They have analyzed these applications based on the application's rating with machine learning techniques.

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1. INTRODUCTION

Over the last some decades, on Networked Information and Communication Technologies (ICT), humans have become more dependent than ever before. The latest survey has analyzed that 70% of the world's population transfers into city areas. The cities' population has increased, which causes more dependence on ICT efficient and intelligent management of critical infrastructures like energy, transportation, and addressing development challenges (Soto-Acosta, Del Giudice, & Scuotto, 2018). The concept of smart cities embraces these ICT challenges for achieving the goals. The smart city concept is the idea of the future where every significant portion of the city relates to the different features such as smart governance, smart living, smart people, smart environment, smart mobility, and smart economy (Sharma & Verma, 2022). The Internet of Things (IoT) plays an essential role in the smart city concept. IoT has excellent characteristics to connect with humans, interact with each other, and perform different tasks from the physical world's surroundings (EULAERTS & JOANNY, 2022). In an intelligent smart city setting, the IoT is easy to access to integrate various devices such as smartphones, vehicles, and home appliances (Bhardwaj, Banyal, Sharma, & Al-Numay, 2022). For different application domains, flexible resource management can be achieved in smart cities by integrating the internet of things.

Electricity is the basic need for lighting in public and private residential areas. The limited resources must meet the demand for electricity with the growing population (Mukhtarov, Dieperink, & Driessen, 2018). One major concern is efficient energy management in an IoT smart city environment. The latest report analyzed that 10% of the energy distribution is utilized by public lighting daily (Rao & Deebak, 2022). Significant lighting resources in residential buildings, hospitals, and offices contribute to excessive electricity use. Smart Lighting System, with many IoT technologies, demands efficient management and control of lighting systems in a smart city. The latest technology, the design on a chip (SoC), has been utilized in different IoT devices. A microcontroller is used as a significant component of SoC (Tripathi et al., 2019). A microcontroller (MCU for microcontroller unit (Zhu, 2018), or UC for μ-controller) is a small computer on a single integrated chip (IC) (Papageorge, Freyman, Juskey, & Thome, 1995). In addition to memory and programmable input/output peripherals, microcontrollers can also include several computing cores. A small amount of RAM, NOR flash or OTP ROM is often included on-chip. Microcontrollers are used for general purpose applications and personal computers and are sometimes designed individually for different embedded systems (Deng et al., 2018).

The number of wireless network sensor installations for real-life applications has risen rapidly in recent years. Nevertheless, the energy challenge remains one of the critical challenges to fully exploiting this technology. Sensor nodes usually are