

Secure LoRa Wireless Communication for Soldier Tracking with the help of Interfacing Two Arduino Uno Devices in Military Operations

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Abstract

In this paper, a Secured LoRa Wireless Communication for Soldier Tracking with the help of Interfacing Two Arduino Uno Devices in Military Operations is presented in brief. This segment introduces a robust and highly secure wireless communication system built upon Long-Range (LoRa) technology, tailored for military applications. The proposed system leverages Arduino microcontrollers to establish a dependable data link between two remote military units, ensuring energy-efficient communication across extended distances. We delve into the system's design, implementation, and encryption methodologies employed to fortify data security. Rigorous testing and evaluation substantiate the system's capability to fulfill the stringent requirements of military communications, including long-range coverage, resilience to interference, and data confidentiality. This research significantly advances military communication technologies, providing a practical solution for safeguarded and efficient data exchange between deployed units. While this paper primarily focuses on long-distance communication, it also delves into the field of Automotive Wireless Communication, specifically Vehicle-to-Vehicle Communication, offering an introductory overview of the latter. The work carried out is the second semester mini-project by the students of Electronics & Communication Engineering under the guidance of the faculties.

Introduction

In contemporary military operations, the significance of efficient communication cannot be overstated; it is a fundamental element for mission success and personnel safety [2]. Long-Range (LoRa) wireless technology has surfaced as a valuable solution for overcoming communication hurdles within military settings. This paper introduces the concept of harnessing LoRa wireless communication through the utilization of two Arduino boards, demonstrating its capacity to transform information exchange in military contexts [1].

Effective communication is essential in modern military operations, as it is integral to mission success and ensuring the safety of personnel [3]. Long-Range (LoRa) wireless technology has proven to be a valuable asset in addressing the unique communication challenges presented by military environments [4]. This paper proposes the implementation of LoRa wireless communication utilizing two Arduino boards, presenting a promising solution for enhancing information exchange in military applications [6]. The utilization of LoRa technology offers the potential to establish robust and secure communication links over extended distances, which is

particularly crucial in military scenarios where conventional communication methods may be unreliable or compromised [5].

The incorporation of Arduino microcontrollers in this context provides a versatile and cost-effective means of creating a dependable communication infrastructure [7]. The paper discusses the benefits of this approach, including its potential impact on military communication, such as improved reliability, reduced power consumption, and the ability to operate in challenging and remote environments [8]. This research contributes to the ongoing advancement of military communication technologies, offering a practical and innovative solution for secure and efficient data exchange in the field [9]. The adoption of LoRa and Arduino technology has the potential to revolutionize military communication practices, providing a robust and adaptable platform for transmitting critical information in diverse operational scenarios [10].



Fig. 1 : Pictorial representation of LORA scenarios

Implementing LoRa Communication using Arduino

In this section, we delve into the practical aspects of implementing LoRa communication through a pair of Arduino boards [11]. We will detail the essential hardware components required, elucidate the procedure for connecting LoRa modules to Arduino, and shed light on the programming intricacies of these devices [12] [20]. Key parameters, including frequency selection, data rate, and encryption protocols, will be examined, highlighting the technology's versatility and its applicability to a range of military scenarios [13] [19]

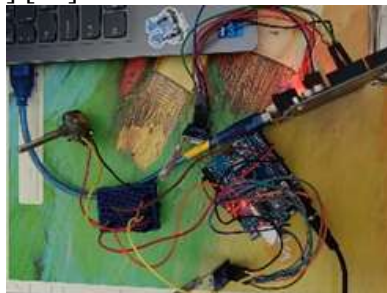


Fig. 2 : Hardware deployment of the LoRa system being developed

Conclusions

Examining specific use cases, operational requisites, and security considerations, it's important to note that, as of my last knowledge update in September 2023, comprehensive details regarding the real-world implementation and outcomes of LoRa technology in military applications may be limited due to security and confidentiality constraints [14]. For the most precise and current insights, it is advisable to refer to official military sources, academic research, and industry publications [15]. Future endeavors related to LoRa communication in military contexts should prioritize the augmentation of security, scalability, efficiency, and interoperability while adeptly addressing the unique challenges and demands inherent to military operations [16]. Collaboration with experts in communication technology, cybersecurity, and military strategy is imperative to cultivate resilient and efficient solutions [17]. These outcomes underscore the substantial potential of the system to enhance military communication, surveillance, and reconnaissance capabilities, thereby bolstering the security and effectiveness of military endeavors [18].

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