International Journal of Research in Engineering, Science and Management
Volume-1, Issue-12, December-2018
www.ijresm.com | ISSN (Online): 2581-5792


# Energy-Efficient Intruder Detection System at Borders Using WSN with 360 Degree Coverage

Linet Cherian[1], Ketaki Dhede[2], Ankita Vaidya[3]
[1,2,3]*Student, Dept. of Computer Engineering, Pimpri Chinchwad College of Engg. and Research, Pune, India*

***Abstract*: Border Protection from intrusion has always been difficult and expensive. External border surveillance is critical to the security of every state and the challenges it poses are changing and likely to intensify. Securing international borders is a complex task that involves international collaboration, deployment of advanced technological solutions and professional skill-sets. However, there are many factors hindering the development of an effective system for international border security and surveillance. Our paper proposes a system that provides security at various places for detection of intruders that will help the army reduce efforts from manual patrolling on the border.**

***Keywords*: Intruder detection, long term recurrent convolution, tracking system, motion detection, access point, border surveillance techniques, WSN, Microsoft kinect, deep learning, neural network, IOT.**

## 1. Introduction

The army uses various border surveillance techniques in order to keep track of any illegal activity and their neighboring countries movements. They use a number of methods for securing the border that include day-night patrolling near the borders which is done in shifts as per the pre-planned routine. Another security technique is building walls of electrified wires. Data collected is passed manually or through a wireless controller leading to false detection or misunderstanding of data. The intruder detection system reduces the workload of the army of continuous patrolling and also the cost of labor. The system makes use of various advanced technologies to help detect actual intruders with the help of a database. The database will contain pre stored data of the soldiers and data can be updated and fetched accordingly. This will help in differentiating in an army person or an intruder.

## 2. Different approaches

The traditional security system consists of manual patrolling of the soldiers. This not only causes problems as they have to work in extreme weather conditions, in unsuitable environments but also increases the cost of labor. A simple miscommunication problem can lead to loss of many lives. Fences containing barbed wires through which high voltage electricity follows can be easily hacked or cut letting the intruders in. There are various techniques through which can help reduce the workload of the army. It includes deploying sensors at various places, data transmission trough WSN and security layers at the borders. Our system helps them discover and handle intruders in any weather and environment. It also provides various techniques to detect the intruders and their exact location. Our system will eliminate daily routines, patrolling and manual information transfer. In [1] Transmission of data through AP is the main focus of the paper. Multi-hop mechanism are used to communicate the sensed alerts to be delivered at Access Point (AP). The observation area is divided into various regions with one AP in each region. They are further divided into sectors. Nodes are deployed sector wise and the AP antenna scans the entire region such that the entire data gathered by the nodes is accumulated at the AP. These signals are then digitized, stored, used as per requirement. This type of system will help in lowering the transmitted power requirements at sensor nodes, minimize the effect of interference to and from other antenna; and reduce delay speed and multipath effects. The AP receives data only from those nodes which detect any event. The AP receivers can identify the unique code and corresponding sensor node and therefore its location. The system generates necessary warnings based on number of intruders and direction of their movements. In [2] it detects a moving object entering the early warning area set by virtual fence function and classifies the moving object as an animal or human intruder. For a human intruder, it generates an early warning and intrusion alarm, and tracks the intruder in real time. A moving object is detected by comparing the background model, pre-generated by acquiring a range of pixel values from a few initial frames, with an input image in real time. In order to detect an object, pixel values of an input frame and a background model are compared and if maximum and minimum values of each pixel are out of range, the intruder is detected. The object is classified in order to determine whether moving objects are real human intruders or animals. Deep learning technology is done through computational model that consists of multiple layers of data processing. The behavior recognition process focuses on analyzing and classifying the newly entered behavior patterns based on predefined behavior models. Patterns are learned through a neural network model composed of multiple computational layers. Behavior of intruders is detected based on these patterns. This system makes use of long term recurrent convolution for detecting the behavior of the intruder based upon the input values and comparison of the output values. In [3] focuses on automatic

surveillance. It proposes a new method for cross border intrusion detection in hilly region. It uses kinect skeletal tracking for recognizing activities performed by the humans. Sequence is determined by feature extraction. Database contains four positions in which human can be detected; walking, crawling, bending and standing. The four actions are recognized by an accuracy of 88.33%. Actions such as walking and bending are easily classified by this system. The Microsoft kinect system can easily differentiate between human and animals to avoid false alarm. This proposed system has detection accuracy of 92%. New users don't need additional training to use the system. With the proposed system, there is greater opportunity to ensure that the guards are alerted and they are do not waste time in chasing false alarms. Moreover, the system works well in plain as well as hilly terrain regions. The given Fig 1. Explains the block diagram for the system.


Fig. 1. Block diagram of the system.

In [4], IoT is used in this work to present an efficient model for border protection. This model is efficient in terms of energy as subnet-based deployment is assumed which localizes the processing at subnet level. In the proposed model, sensors and gateways having RFID tags for unique identification are deployed on the border in pre-planned manner to form subnets. Sensors are used for detecting intruders on the border. If the intruder is detected then sensors report to a gateway node. The gateway node acknowledge that the intrusion information is received. The gateway node send message on the mobile phones of the nearest border troop having RFID tags about the intrusion and the troop acknowledge that the intrusion information is received. Then the troop come to catch the intruder if that is harmful to the country. Even if an intruder is not identified by a border troop, he is detected, reported and caught by deploying this system after its implementation.

## 3. Conclusion

This survey has been performed for gathering the details of Intruder detection system and to find out different effective methods which are useful for detection of an intruder on field. Difference between animal and human intruders can be easily done with the specified methodologies in order to avoid false alarm. The system reduces time consumption and pain of manually detecting intruders. The system is useful to automate the detection process which helps in reducing complex work.

## References

[1] V. Thattil and N. Vasantha, "Energy efficient approach to intruder detection in militarily sensitive border using Wireless sensor Networks," *2011 3rd International Conference on Electronics Computer Technology*, Kanyakumari, 2011, pp. 42-46.

[2] Seung Hyun Kim, Su Chang Lim, Do Yeon Kim, "Intelligent intrusion detection system featuring a virtual fence, active intruder detection, classification, tracking, and action recognition, *Annals of Nuclear Energy*, vol. 112, pp. 845-855, 2018.

[3] Raheja, Jagdish & Deora, Swati & Chaudhary, Ankit. (2015). Cross Border Intruder Detection in Hilly Terrain in Dark Environment. Optik - International Journal for Light and Electron Optics.

[4] H. Afzaal and N. A. Zafar, "Modeling of IoT-based border protection system," *2017 First International Conference on Latest trends in Electrical Engineering and Computing Technologies (INTELLECT)*, Karachi, 2017, pp. 1-6.