

ABSTRACT

The rapid growth of e-commerce has significantly increased the demand for reliable package delivery systems. However, the high volume of deliveries often encounters several issues, such as lost packages, weather-related damage, or the absence of the recipient at home. To address these problems, this study proposes the design and development of a vertical smart box prototype for package reception, based on the Internet of Things (IoT), equipped with real-time notifications to the recipient through a mobile application.

The *Smart Box* implements a security system based on sensors and a lift mechanism to ensure that packages are not subjected to harsh impacts during the delivery process. Real-time notifications sent to the owner when a package is inserted enhance both safety and convenience for recipients and couriers. This innovation is expected to be an efficient solution to improve package delivery systems and reduce the risk of loss and damage.

The test results show that all system components function properly. The ultrasonic sensor accurately detects objects, the load cell sensor distinguishes package weight based on threshold values, and the vibration sensor successfully triggers an alarm in the event of interference. Furthermore, the mobile application is capable of displaying information and sending notifications promptly. Quality of Service (QoS) testing demonstrates varying network performance across different times of the day. The best delay was recorded in the afternoon at 358.51 ms, while the highest delay occurred at night at 612.39 ms. Nevertheless, the average jitter value of 5.018 ms falls within the "Good" category, indicating stable data transmission.

Keywords : *Vertical box, Internet of Things, Real-time notification, Package delivery, Mobile application*