

The proposed wireless sensor device for breach detection based on a motion sensor is an innovative solution in the field of security and the behavior of objects within a controlled area. It is equipped with the ESP32-S3 microcontroller, which supports modern wireless communication protocols such as Wi-Fi, Bluetooth, ESP-NOW and Coded PHY Long Range modes.

One of its key components is the multi-zone Time of Flight (ToF) sensor VL53L8, which allows for precise distance measurement and intelligent analysis of movements, object behavior, and gestures. This device can be utilized in various sectors, including security systems, smart homes, and in industrial and commercial facilities where territory monitoring is required.

Compared to known analogs, it offers significantly higher efficiency due to the integration of AI algorithms that enable the detection of suspicious behavior, as well as the capability of self-organization of multiple devices in dynamic Mesh networks (including placement on board drones) to cover large areas with complex topology and numerous interferences, ensuring the system's functional resilience. The availability of adaptive power management in the Deep-sleep mode makes it ideal for use in conditions where long-lasting autonomy is important. This device not only enhances security monitoring but also opens up new prospects for integration into automation systems, increasing their compliance with modern security requirements.