

ABSTRACT

The increase in child abduction cases in recent years has caused concern for many parents, especially when children are out of the house without direct supervision. The main factors leading to the high number of abductions are weak neighborhood security systems, lack of parental supervision, and technological limitations in monitoring children's location. However, most of the existing systems still have limitations in location accuracy, battery life, and responsiveness to emergencies. Therefore, this research develops an Internet of Things (IoT)-based child location monitoring system that enables position monitoring with faster and more responsive emergency alert features.

The system consists of Wemos Lolin ESP32 microcontroller, Quectel L86 GPS module, and SIM800L GSM module to transmit location data to the server. The location data is sent in coordinate format and can be accessed through an OpenStreetMap (OSM) based monitoring website. In addition, the device is equipped with a panic button that allows the child to send an emergency signal to parents, as well as a buzzer as an additional alarm in an emergency.

The test results show that the system is able to provide an average location accuracy of 5.64 meters in an open environment, 5.8 meters in a semi-open environment, and 7.08 meters in a closed environment. The time for sending location data to the server averaged 18 seconds, while emergency notifications in the form of SMS were received within 8.78 seconds after the panic button was pressed. In addition, the device's endurance ranges from 5 to 13 hours depending on the intensity of use. Based on the test results, this system can be an effective solution for parents in monitoring their children's location as well as improving children's safety in the outside environment.

Keywords : *Internet of Things, child tracking, GPS, GSM communication, emergency alert.*