

ABSTRACT

Coastal areas often struggle to access clean water due to high salinity levels caused by seawater intrusion. This condition impacts groundwater quality, rendering it unsuitable for consumption. To address this issue, a system capable of producing fresh water effectively and continuously monitored is needed.

Several desalination methods, such as solar stills and reverse osmosis, have been implemented, but each has its drawbacks. Solar stills are highly dependent on sunlight and require large areas of land, while reverse osmosis has high operational costs and produces concentrated salt waste. Furthermore, existing salinity monitoring systems are manual and inefficient at detecting changes.

This study designed a thermal desalination system integrated with Internet of Things (IoT) technology using ESP32, TDS sensors, and water level sensors. Data was periodically sent to the ThingSpeak platform for monitoring. Test results showed a decrease in TDS levels from an initial value of 1043–1131 ppm to 33–47 ppm, with an average desalination efficiency of 50.2%. The TDS sensor demonstrated high accuracy with average errors of 1.51% and 1.80%, respectively. The system also recorded an average data communication delay of 0.43 seconds. This system can be a practical solution to support clean water provision in coastal areas.

Keywords: *Salinity monitoring, ESP32, seawater desalination, TDS sensor, Thingspeak.*