ABSTRACT

Manual fuel refilling records pose a risk of human error, inefficiency, and difficulty in real-time access, which can lead to inaccuracies in fuel management and increased operational costs. To address this issue, a prototype of an IoT-based fuel refilling recording system was developed using ESP32 as the main controller. This system integrates a flowmeter sensor to measure fuel volume, an ultrasonic sensor to detect liquid levels in the tank, and a buzzer as a warning indicator when the fuel stock is running low. The recorded data is transmitted in real-time to Google Spreadsheet via a WiFi connection, making it easily accessible and eliminating the need for manual recording. Calibration was performed using a measuring cup as a reference and applying the K-Factor value to determine fuel volume calculations. The test results show that the flowmeter sensor records an average of 408 pulses per liter, with an error rate decreasing from 12.17% at small volumes (200 ml) to 1.73% at larger volumes (1000 ml). With a standard flow rate per 1000 ml, the system has an error rate of 1.73% and an accuracy of 98.27%, which is still within the acceptable error tolerance of ≤3%. This system can automatically record fuel refilling data accurately and in real-time. To ensure measurement accuracy, the device must be placed in a location protected from direct sunlight and rain, and the pump or generator speed must be controlled to maintain a stable fuel flow. With this implementation, fuel recording becomes more efficient, reduces human errors, and enables precise fuel usage monitoring.

Keywords: Fuel, ESP32, IoT, flowmeter, Ultrasonic, Google Spreadsheet