IMPLEMENTATION OF TELEGRAM BOT AS A NOTIFICATION SYSTEM FOR EXCHANGING COUNTER VENDING MACHINE BOTTLES TO CASHIER

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ABSTRACT

Plastic waste, especially bottled packaging, is one of the largest contributors to environmental pollution in Indonesia. According to data from the Ministry of Environment and Forestry (KLHK), Indonesia produces more than 17 million tons of waste annually, with approximately 15% being non-biodegradable plastic waste. Conventional plastic waste management still faces numerous challenges, including a lack of public awareness in sorting and exchanging recyclable waste and the absence of practical and efficient incentive systems. This study proposes an Internet of Things (IoT)-based solution by utilizing a Telegram Bot as an automatic notification medium from the vending machine to the cashier. The system is designed and built using an ESP32 microcontroller integrated with an infrared sensor for detecting bottle types (plastic and cans), an ultrasonic sensor for monitoring bin capacity, and various input-output modules such as a 4x4 keypad, I2C LCD, and a thermal printer. The system is developed to record transactions, print exchange receipts, and send real-time automatic notifications to the cashier's Telegram account containing the number and type of bottles deposited. Test results show excellent performance. The infrared sensor successfully identifies bottle types with 100% accuracy, the ultrasonic sensor maintains an average accuracy of over 98%, and all input-output modules function without issues. The system completed all testing scenarios with a 100% success rate, from user input and classification to receipt printing and notification delivery.

Keywords: Vending Machine, ESP32, Telegram Bot, IoT, Infrared Sensor, Ultrasonic Sensor, Bottle Waste, Automatic Notification.