

DESIGN AND CONSTRUCTION OF SMART TRASH PROTOTYPE USING RFID BASED ON IoT (Internet of Things)

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ABSTRACT

In an effort to improve the efficiency of better waste management, this study aims to design and build a prototype of a smart trash can based on RFID (Radio Frequency Identification) and IoT (Internet of Things) technology. This smart trash can is designed to identify the capacity of the trash using ultrasonic sensors and limit access to the trash can using RFID tags attached to the trash. Data collected by the ultrasonic sensor is then sent to the IoT platform for further processing and analysis and RFID data will be detected on the programming serial monitor. This prototype is equipped with several main components including an ultrasonic sensor reader, RFID, microcontroller, servo, buzzer, wireless communication module, and IoT server. This system allows real-time monitoring of the trash capacity, as well as providing information to waste managers when the trash can is almost full or requires special attention. In addition, the data collected can be used to analyze waste disposal patterns and assist in planning more efficient waste management strategies. The test results show that this prototype system can function well in monitoring the capacity of the trash based on ultrasonic sensors with a total percentage error value, namely ultrasonic sensor 1 of 51.4% and ultrasonic sensor 2 of 76%. Then for the average percentage error value on ultrasonic sensor 1 is 3% and ultrasonic sensor 2 is 4.8%. And able to identify RFID with a maximum reading distance of RFID tag Card to RFID is 4cm with a reading time of 2.92 seconds and a minimum of 1 cm with a reading time of 0.83 seconds. And for testing on UID Tag Cards that are not registered in the programming, RFID cannot detect the UID Tag Card based on the RFID tag used. And able to send data to the IoT platform in real-time. Then for the overall test results, the tool has a success rate of 100% according to the parameters in the programming that has been set. With further implementation and large-scale development, this system is expected to be an innovative solution in overcoming the problem of more effective waste management.

Keywords: *Smart Trash Can, RFID, IoT, Waste Management*