Smart Trash Bins for Identification of Trends and Factors in Municipal Waste Disposal

Bui, Cole (School: Patrick F. Taylor Science &amp
Technology Academy)

This study aims to discover how IoT devices and trash bins can be used in conjunction with one another to discover trends in trash generation and minimize trash overflow. Using an Arduino microcontroller, trash bin, and ultrasonic sensor, a smart bin was constructed. The smart bin was placed in two locations around a school in order to determine the factors that affect trash-filling behavior. Additionally, quantitative data was collected on how and when the bin fills in each of the environments (hallway or classroom) over the course of four days surrounding time, proximity to people, and purpose of use. Upon completion of the experiment, it was found that smart bins with greater proximity tended to fill much more than their isolated counterparts; differences in trash generation went up to 128 percent. Moreover, trash bin use varied greatly between the classroom and the hallway, to the point where even the isolated areas of the classroom had more trash generation than the hallway locations with high proximity; the isolated location of the classroom filled 18.6 percent more than in the hallway. Finally, time had an effect, where trash bins filled irregularly due to the school schedule. The study has demonstrated its effectiveness in finding factors of trash generation in schools. Taking into consideration that cities have a global issue regarding waste overflow, this novel smart bin can be tested in cities to potentially address and minimize waste pollution.