Smart Waste Classifier

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Waste classification before collection is essential for the better management of household waste by municipalities. However, very little attention is paid to domestic waste classification at household level in Sri Lanka. To overcome the inefficient manual waste classification method, we have proposed a smart waste classifier model that can categorize dry, wet, and metal garbage in order to solve the existing waste classification issue. This system works as when a person puts waste into a dustbin, three sensors detect it: an infrared sensor to detect the waste, an inductive sensor to detect metallic nature and categorize it as metal waste, and a soil moisture sensor to check the moisture level in the waste thrown inside and classify it as wet waste if the humidity level exceeds a threshold value. To make a better decision on waste classification, along with the sensors, Convolutional Neural Network (CNN) is used. An ESP32 camera is fixed in the trash can which will capture the image of the waste and let CNN to classify the waste. After the CNN identifies the waste, it is thrown into the proper bin using a servo motor that spins at 180 degrees, and a step motor that revolves at 360 degrees with the three bins attached and rotates in response to the waste detected. The Arduino UNO is used to connect all of the sensors and motors. By using this model, we were able to classify the waste as dry, wet, and metal. The CNN yielded an accuracy of 99% in waste identification under different sets of images taken at different angles. The model allows people to discard the waste into a dustbin, regardless of its nature. The model itself then classifies and transfers the waste into the appropriate dustbin. Moreover, the three dustbins are monitored by a sensor to check whether the dustbin is filled or not.

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