PROBLEM STATEMENT

SMART WASTE MANAGEMENT SYSTEM FOR METROPOLITAN CITIES

Problem Definition

The current process of waste management starts with the waste being created by people in the cities and disposed in trash bins near its creation point. The disposed trash is collected by municipality or private company trucks at the predefined times and transferred to temporary collection centers. The trash at the collection centers is then sent for recycling.

This process in current city setting solves the waste problem partially while it creates other problems such as;

- Some trash bins are overfilled while others are underfilled by the trash collection time,
- overfilled trash bins create unhygienic conditions,
- unoptimized truck routes result in excessive fuel usage and environmental pollution and
- all collected trash is combined which complicates sorting at the recycling facility.

Some of these problems can be mitigated by implementing smart waste management systems.

Problem through smart waste management system

The waste management services take care of a healthy environment allowing optimization of the utilities and prevent overloading the carrier for waste disposal. Smart waste management also contributes to the overall waste recycling efficiency and provides the route optimization opportunity for utilities to reduce traffic and fuel use.

An example of a modern smart waste management system would include; a sensor attached to the trash bin that measures fill level; and a communication system that transfers this data to Cloud. Data is processed in the Cloud. thus, the route of collection trucks is optimized.

Smart waste management companies have recently developed solutions based on ultrasonic distance measurement. Some companies prefer to approach the problem with an alternative solution using image processing and camera as a passive sensor. However, the majority of these solutions use ultrasonic sensor for measurement of the distance.

Ultrasonic sensors use a well-known sonar technique to perform measurement of the distance between the sensor and an obstacle. The sensor consists of an emitter that sends the sound pulse and a receiver that detects that pulse upon its reflection from an object. The distance to an object can be determined by measuring the time between emitting and receiving a pulse since the speed of sound is known. As stated in Table 1, besides the determination of the fill level by implementing different kinds of sensors additional data may be obtained. These sensors monitor other parameters related to the status of the container such as position using GPS or motion sensors to register container collections, movement to detect possible vandalism.