

SMART WASTE MANAGEMENT FOR METROPOLITAN CITIES

ABSTRACT:

PAPER 1:

Authors have proposed a useful garbage collection through shortest path semi static and dynamic routing for controlling traffic that is created by the trucks which carrying the waste. Here they have used two layers, in which upper layer is semi static shortest path routing model. This layer contains the waste collection terrain for each city sector. Lower layer dynamic shortest path routing model handles the dynamic requirements of real time routing in case of emergency. Waste routing was achieved by the Ant colony system algorithm (ACS), in turn to group the garbage bins allocation in the form of clusters, they have used K-means algorithm. By using above mechanisms the authors effectively measured distance covered, time spent, fuel consumption and the quantity of solid waste collected. They have mentioned the future work will be in the area of time critical scheduling, where once the waste bins are full and need to be emptied at the earliest by available waste collecting vehicles.

PAPER 2:

Authors have illustrated the Top-k query based dynamic scheduling for smart city garbage collection. They introduced Top-k query to denote the number of filled bins in turn to begin dynamic scheduling. Authors have used adaptive large neighbourhood search algorithm to determine the cost optimal routes for the trucks to empty the bins. They used roll on-roll off routing mechanism to help several dumping services to collect large amount of garbage from the location of shopping malls and construction sites. The demerit of this model is, in dynamic scheduling depending on the k-value, CPU overhead cost is high. The future work they mentioned is dynamic routing model depends on fuzzy demands. Here the customer acts as variables of fuzzy.

PAPER 3:

The waste collection as a potential Internet of things service which exploits robustness and cost efficiency of different types of fleets. Authors have used robust dynamic routing algorithm to find the shortest path, by this they achieved cost efficiency. They used Android app for truck navigation, GPS to track the truck location, RFID to identify the certain bins and actuators to lock the lid of the bin when bin gets full to avoid the overflow of the garbage. Here they used two types of trucks: High Capacity Trucks (HCT) to transport waste from depots to dump yard and Low Capacity Trucks (LCT) to transport waste from dump yard to depots.

PAPER 4:

The authors aim at inventory routing for dynamic waste collection. Here they mainly focus on the problems of scheduling of emptying the containers and to take quick decision on selection of nearest route for the vehicles. By this the garbage collection costs can be minimized and at the same time customer satisfaction can also be improved. Here they used heuristic approach to deal with the dynamic and stochastic nature of the problem. Here they considered two policies viz. Sequential Rigging Optimization (SKO) and Hierarchical knowledge gradient (HKG). HKG quickly identify the optimization areas within the network space and then use SKO for communication.

PAPER 5:

Authors aim at designing an integer programming model. The main goal of this model is to make the decision maker's job easy in two important aspects. Selecting the location of the dust bin and defining the capacity of the dust bin to be placed in each collection sites. Authors have proposed a two phase heuristic approach to solve the above problem. Authors have undergone the difficulty of where to place the dust bin in collection sites of the urban waste management system.

PAPER 6:

Authors have proposed a system, where multiple dustbins are located throughout the city. These dustbins are embedded with low cost devices and unique ID will be given for every dustbin in the city. This will help in tracking the level of garbage in each bin. In this system, these bins are connected to the internet to get the real time information of the smart bins. By implementing this system authors have achieved cost reduction, resource optimization, real time data transmission and effective use of smart dustbins. They have mentioned the future work as; the system can be implemented with time stamps.

PAPER 7:

Authors have developed a model that identifies the level of garbage in the bin. By using wireless sensor networks and embedded Linux board it send message for cleaning of the bin to the authorized person. This system gives a web interface to the cleaning authority so that they monitor and clean the garbage bin. Here they used Raspberry Pi as an embedded Linux board, it makes communication to be distributed to sensor nodes located in the sensor area via ZigBee protocol and itself act as a coordinated node in the wireless sensor network. Aim of coordinated node is to gather the factors such as level of the bin and odor and transmit the wireless message. The smart waste bin display a message for emptying the waste bin when the waste bin is about to fill through the coordinator node.

PAPER 8:

Authors have proposed an integrated system combined with an incorporated system of Radio Frequency Identification (RFID), General Packet Radio Service (GPRS), Geographic Information System (GIS) and web camera. Built in RFID was used mechanically to fetch all types of client data and dustbin data from RFID tag, GPS would give the locality data of the truck available. Through GPRS communication system the entire information of the centre server will be automatically updated. To obtain real time truck tracking and monitoring information of the system authors have used an integrated system which consists of RFID, GPS, GPRS, GIS and web camera. The future work they have mentioned was analysing storage information by authority for garbage management. In order to achieve this, one need to concentrate on vehicle management, route management, dumping site selection etc. To deal with the problems of waste management and also a system to work in a real time.

PAPER 9:

Authors have used RFID and sensor model. This model mainly gives the solution to the automatic garbage recognition, weight and identification of the stolen bins. RFID waste tag read the data without really seeing it. Also, waste tags are capable to store a large amount of information easily and more rapidly when compare to bar codes. To lower the waste tag price authors have selected a 13.56 MHZ solution. When the driver of the garbage collection truck complete his work shift, personal digital assistant then sends all the information to a SQL back end server for storing and processing the

garbage information in real time. The data related to garbage is carried out via WIFI connection and the Internet.

PAPER 10:

Authors have proposed a system that alerts municipality when the bin is about to fill so that they empty the bin on time. This Smart garbage bin model separates five types of plastic resins by using Near Infrared (NIR) spectroscopy and rest of the biodegradable waste will be used to produce the biogas. The Beer-Lambert law is the inherent nature of NIR spectroscopy. The law states that when absorbance increases the thickness of the sample is also increases; it means both are directly proportional. The drawbacks of NIR spectroscopy process are: It will not work if garbage is covered in black plastic and will not identify pet bottles if they have covered by plastic caps. Using GSM technology this model automatically emit a notification when the dustbin is about to fill and NIR reflectance spectroscopy method helps to separate and take out plastic piece from the wastage to generate some renewable source of energy.