LITERATURE SURVEY
SMART WASTE MANAGEMENT SYSTEM FOR METROPOLITAN CITIES

S. Paul et al. [3] smart garbage monitoring system using IoT based on Arduino UNO which monitors the bin level and segregated biodegradable and non-biodegradable waste. The system uses ultrasonic sensor to measure the bin level in the dustbin. A servo motor is used to segregate the bio-degradable and non-biodegradable waste by moving the waste left and right. A RC-A-524 Metal Detector Sensor Module is used to detect whether the waste is metallic or not. If waste has metallic content, it is marked non-biodegradable, otherwise it is marked biodegradable. Two IR sensors are used. First IR sensor is placed on the top of the bin which detects the waste and activates the metal detector. Second IR sensor is placed at the bottom of the bin which checks if the garbage has been kept outside the bin. An OV7670 image sensor collects the image data and a Computer Vision API is used to check whether the waste is an objectionable item or not. All these sensors and circuits are interfaced with Arduino UNO. ESP8266 WiFi module is connected to the system which grants WiFi access to the system. This monitoring also has an alert system for certain wastes such as bombs or weapons.

Chen et. al. [6] proposed a Smart Waste Management System that uses a microcontroller unit along with infrared sensor, gas sensor and a 3-axis compass. The microcontroller unit is used as an interface between the sensors and the server. The infrared sensor and gas sensor are used to determine the fill level and the smell level of the dustbin respectively. The readings from these sensors are sent to the server via WiFi module in indoor settings and Long Range module (LoRa) in outdoor settings. The data sent to server is then stored into a MySQL database by the Data manager. The data is monitored periodically by the alert function and when the fill level of dustbins cross the threshold level, a notification function is evoked which sends the notification to the truck driver along with route that is created using Google Maps.

Andreasi et al [8] accomplished a comparative analysis on solid household waste and its impact on environment in seven European countries such as Germany, Denmark, France, UK, Italy, Poland and Greece. The authors considered those countries to represent the whole European Union. The collection, separation, treatment and disposal process as the waste management in this research. All countries need to update their technology periodically to meet the current challenges in the waste management process.

Shilan et al [9] from Iraq developed a smart solid waste monitoring and collection system. Ultrasonic Sensor Arduino Uno and Radio Frequency (RF) transmitter were installed on the top of the waste box for the monitoring task. A message (SMS) will be sent to the mobile phone of the truck driver about the location and ID of the dustbin whenever the waste box is full and needs for disposing the garbage.

A Geological data framework transportation model for robust waste accumulation that elaborates arrangements to waste storage, gathering and transfer has been suggested in [3] for the city of Asansol situated in India. An improved directing and planning waste gathering model is suggested to the Eastern Finland, emphasizing the use of a guided variable neighborhood threshold meta-heuristic. The main motive is to create an ideal calendar to trucks looking into characterized gathering routes.

Andrei Borozdukhin, Olga Dolinina and Vitaly Pechenkin, [4] this proposed system consists of two parts: software and special signaling equipment. The equipment is placed on the side walls of the bin which consists of two parts: one is the receiver-transmitter and sensor. Sensor

is used to indicate the level of the bin which is connected to the transmitter that transmits a signal of fullness of the bin to the receiver at the server host. A manager is appointed at the server side whose job is to find the shortest route and intimate it to the truck driver to collect it in a short interval of time [3].

Thompson A.F, Afolayan A.H, Ibidunmoye E.O projected work about the internet-based platform for the organization and monitoring of waste collection, discarding and carrying etc. This is comprised of the client, server and storage. The client is the device which can access the pages and forms used by web application e.g. PDAs, phones, laptops etc. the desktop is a program that launches the application and makes it performs over the internet. In this, the back-end system is the web server and database management system that supervise the data used by the function to monitor the movement of data between user and system. The limitation of this paper is that it only shows the location of the bin in the web page[4]. In the proposed system, the level of waste in the dustbins is detected with the help of Ultrasonic sensor. Force sensor is used to measure the weight of the dust bin. When the measured value of sensors exceeds a certain threshold value then red led becomes ON (i.e.it indicates dustbin is filled else green led is ON) this information with GPS location where the dust bin is located is communicated to android device through GSM system. Android device will detects, in which area dustbin is located, by comparing coordinates and updates the location and inform the respective vehicle to collect the waste. Microcontroller is used to interface the sensor system with GSM system. This will help in managing the garbage collection efficiently.