MINISTRY/ ORGANISATION NAME : CDK GLOBAL **TECHNOLOGY BUCKET** : WASTE MANAGEMENT **CATEGORY** : SOFTWARE
PROBLEM STATEMENT : GEO TRACKING OF WASTE AND TRIGGERING ALERTS AND MAPPING AREAS WITH HIGH WASTE INDEX
TEAM NAME : TECH TYCOONS **PROBLEM CODE** : RA26
TEAM LEADER NAME : NIHARIKA DHINGRA **COLLEGE CODE** : 1-3512387138

IDEA OF APPROACH

Waste monitoring and management system is the integration of communication technologies such as RFID, GPS, GSM and GIS for truck monitoring system. In proposed system, truck database has been developed in a way that information of truck ID, driver ID, date and time of waste collection, etc., are compiled and stored for monitoring and management activities. The system is able to monitor the waste collection process and manage the overall process of waste management. It provides in time waste collection, vehicle tracking through the GIS database using GPS technology and also overcomes the disadvantages such as usage of minimum route, fuel cost, clean environment and available vehicle. The technologies used in the system are good enough to ensure the practical outcomes and perfect for green environment.

1. SMART APPLICATION FOR WASTE MANAGEMENT

a. Monitoring real time movement.
b. Track the vehicular movement.
c. Tracking broken vehicles.
d. GPS will help identification of vehicles that breaks down during operation.
e. Reduces the dependency on road side temporary storage facilites.

2.SMART ENVIRONMENT MONITORING

a. Monitoring of waste spillage,Garbage heaps across the city.
b. Measure the characteristics of emission and outflow of treated leachate.
c. Heat Sensors at the landfills would raise an alarm in case of fire.

3. SMART HUMAN RESOURCE MANAGEMENT

a. Real time data of Staff position, waste storage depots, transfer stations etc.
b. Coordination through a SMART CONTROL ROOM.

4.SMART GRIEVANCE PORTAL FOR CITIZENS

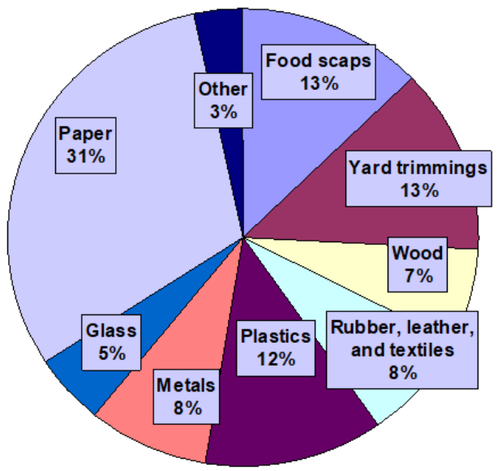
a. Mobile based applications or SMS Facilities to enable the citizens to lodge complaints.
b. Informs the users about timings of collection of waste, Authorized personals etc.

5. DRONES

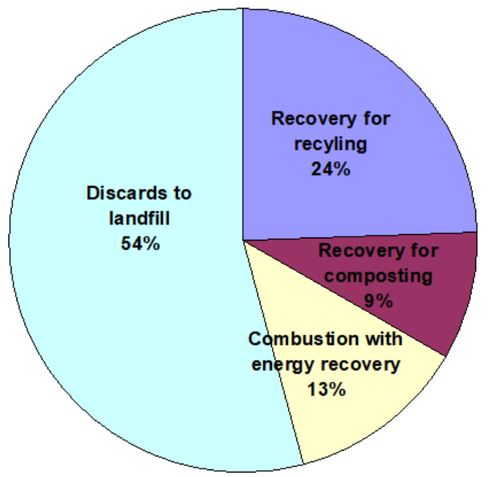
a. Real time information.
b. Provides a bird's eye view.
c. Landfill monitoring.
d. Drones can identify litterbugs.

6.GPS ENABLED VEHICLES

a. Low cost of installation.
b. RFID Tag readers at key junctions.
c. Ease of monitoring



COMPOSITION



MANAGEMENT

TECHNOLOGY STACK

FLASK FRAMEWORK
FRONT-END

CONVOLUTIONAL NEURAL NETWORK
IMAGE PROCESSING

ANDROID STUDIO
APP DEVELOPMENT

ALERT

CLOUD API

SENSORS

DATA

INTERNET OF THINGS
ARDUINO UNO

SQL / FIREBASE

USE CASE

END USER

LOGIN

<include>
USER ID
INVALID CREDENTIALS
PASSWORD
FINISH

GEO - TRACKING OF WASTE
<include>
WASTE INDEX
<include>
GPS
<include>
DIRECTION OF WASTE
<include>
GOOGLE MAPS

MONITORING SYSTEM
<extend>
SENSORS
<include>
<include>
ALERTS
<include>
WASTE QUANTITY

SCHEDULING
<include>
PICK
<include>
DROP

ADMIN

TRUCK DRIVER

Most favoured option

PREVENTION
MINIMISATION
REUSE
RECYCLING
ENERGY RECOVERY
DISPOSAL

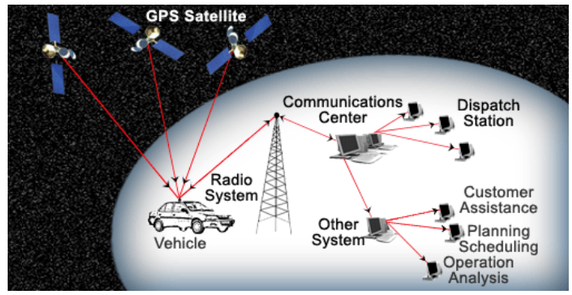
Least favoured option

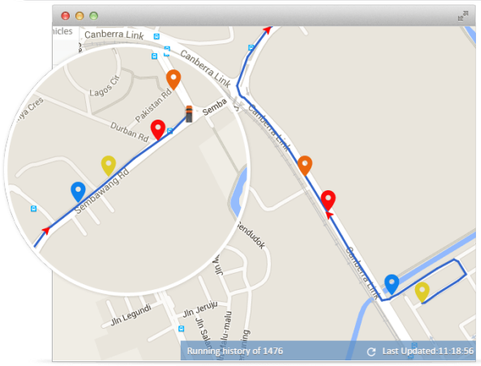
WASTE MANAGEMENT HIERARCHY

TRACKING OF WASTE CONTAINERS

AUTOMATED VEHICLE TRACKING SYSTEM

1. The vehicles will receive the positional information through a process of triangulation.
2. The information is then sent across the Data Centre through the wireless communication link-GSM/GPRS.
3. The GPS data to be integrated with a GIS Map for identifying the location of Waste Management vehicles on real time basis.
4. This system will also have facility to identify functional status of the vehicles in form of interactive user friendly querying tool and reporting tool.



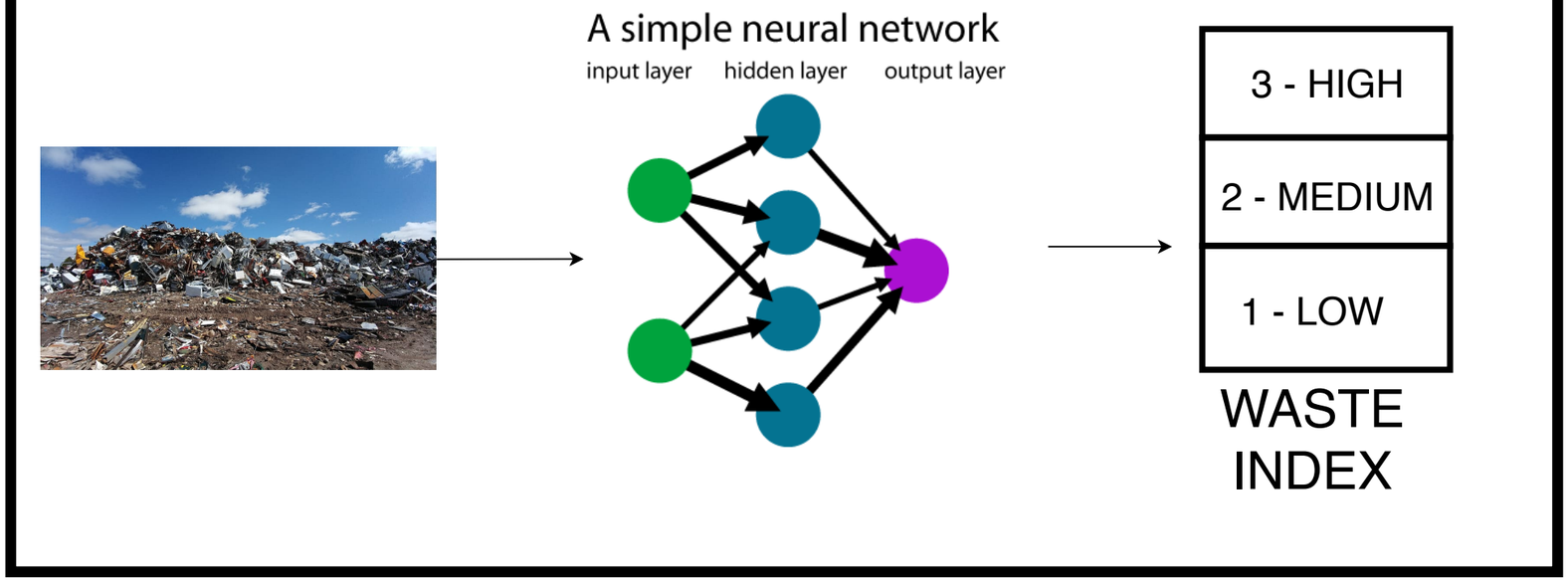


INTERACTIVE WASTE CONTAINER MAP

1. In the web application,we can geo track all the waste containers.
2. The map will also show the waste container's status,latest activity and last known location.
3.Users can also use Google Maps to guide them to a specific piece of equipment.

STEPS FOR DEVELOPMENT OF SOLUTION

1. Simulate a trigger model by calling an API and passing data values:-
   (a) GPS Location.
   (b) Date and Time.
   (c) Image of waste.
2. Interface to read the trigger and alert the closest proximity Municipal Staff.
3. Analytics to cluster the data and provide analytics by region.
4. Visualization report to view GPS Location of Waste and also view history of the site after 24 hours and report status.



DEPENDENCIES :-

1. GOOGLE MAPS API.
2. SENSORS.
3. IBM CLOUD.
4. NOSQL DB
5. ANDROID PHONES SUPPORTING INTERNET

ADVANTAGES :-

1. SMART AUTOMATED MONITORING SYSTEM OF WASTE.
2. INTEGRATED SOFTWARE AND HARDWARE MODULES.
3. SEND OPTIMIZED TRACK TO DESTINATION WASTE TO DRIVER.
4. ACCURATE CATEGORIZATION OF WASTE USING NEURAL NETWORK.