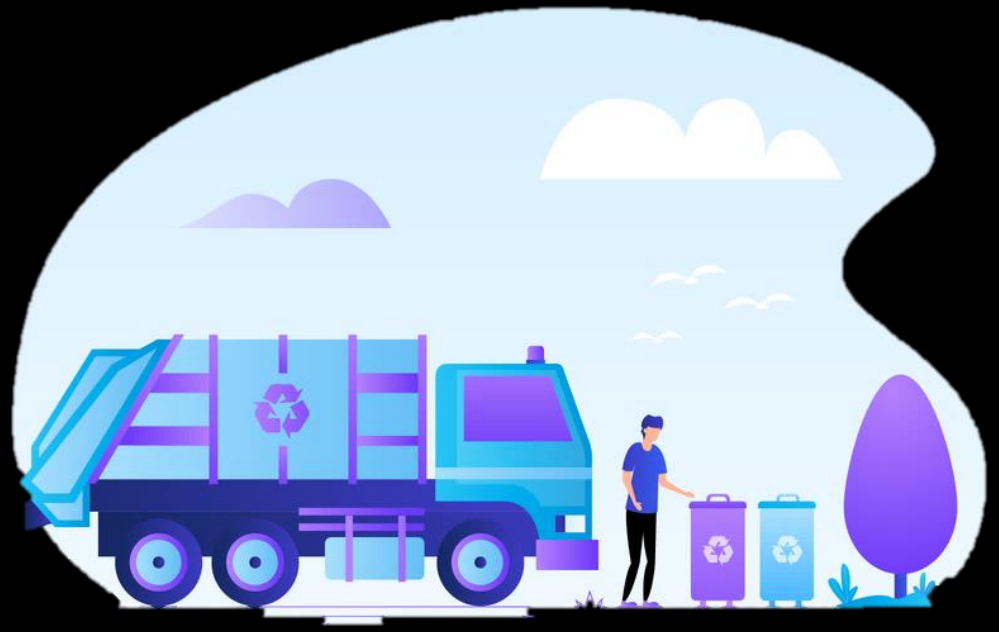
Title

Urban Waste Collection,
Disposal and Management



SEGRO

SAY GROW to our environment

Problem Statement

- To provide an end-to-end solution for efficient waste collection, segregation and management in urban areas.

Domain Bucket

- Waste Management

College Name: Code

- Sardar Patel Institute of Technology: 1-3516276991

Team Name: Lead

- Paryavaran AI: Manan Doshi

"Urban waste collection and management is the need of the hour, so as to reduce pollution, spread of epidemics, and various other ill-effects of open solid-waste disposal. We are a team of full-time problem solvers, attempting to achieve an efficient solution to urban waste management in SIH 2020."

Idea/Solution

Problem Statement

- As of July 2019, nearly 15,000 metric tonne of solid waste remains exposed everyday resulting in almost **55 lakh metric tonne of open solid waste disposal** every year.
- An inevitable need to manage solid waste generated from households in urban areas by employing **efficient means of segregation and collection**.
- Allow for **efficient and eco-friendly garbage collection**.
- Allow for **efficient utilization of solid waste** by making them available to recycling industries and providing easy access to a marketplace for the finished, recycled products.

Solution

- To develop **IoT-enabled smart bins** that can **automatically classify waste** into their corresponding containers and **alert collection agencies**, when they are filled above a threshold value.
- To develop a mobile application and a web application to assist citizens in **locating smart bins, nearest to them, using geo-fencing**.
- To develop a mobile application and a web application to assist garbage truck drivers in **efficient waste collection by providing least-cost routes**.
- To provide an **online marketplace** to recycling industries for sale of recycled products, combined with **powerful BI tools**.

Unique Selling Points

- The smart-bins **eliminate the need to manually sort and segregate** waste.
- **Automated alert system** prevents overflowing of bins which curbs the currently existing health hazards and prevents spreading of diseases.
- **Optimal routes** calculated via TSP-based routing algorithm incurs lowest cost, and thus saves fuel.

Unique Selling Points

- The platform can be used to **spread awareness** about waste segregation and management in rural, as well as, urban areas and promote government's idea of **Swatch Bharat**.
- Connecting buyers and sellers of recycled products via an online marketplace **promotes the overall idea of recycling**.

Workflow

Waste generated in urban households and localities.

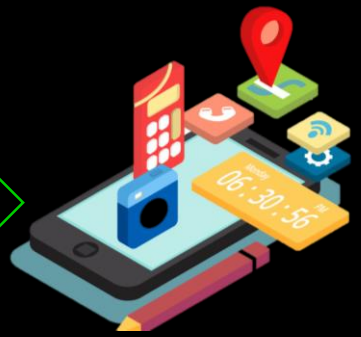
IoT-enabled smart bins classify waste, enabling automated segregation and continuous monitoring alerts collection agencies upon filling.

Waste collection trucks are alerted via a mobile app, the route to all the bins; this route is identified using a TSP-based approach to minimize cost, in terms of fuel.

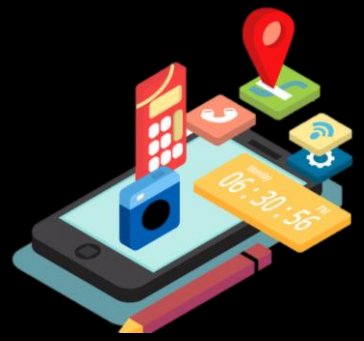
Collected waste is then delivered to the corresponding recycling industries.

Efficient waste collection using IoT-enabled smart bins with CNN-based image classifier and genetic-algorithm based TSP implementation.

Waste may be generated while travelling.



Mobile app uses geo-fencing to locate nearest smart bin.



Truck drivers use the mobile app to gain knowledge about routes and notifications.

Garbage Truck driver

Tech Stack

Database Storage
[SQLite]

Backend: Django

Front-end: Mobile
[Dart, Flutter]

Front-end: Web
[Angular 6, Bootstrap, HTML5, CSS3, JavaScript]

Use Cases