Imagine IOT Prototype

Intelligent Waste Management Application

Story
The Municipal corporation manager needs a solution to effectively monitor and collect waste from waste bins located at various locations in Bangalore, India.

Storyline
The Municipal Corp. Manager is interested in knowing any factors that could improve the waste management process. He/she needs to know the filled and unfilled waste bins with their locations on daily basis. Also presently he/she is assigning work orders based on static routes that’s covers unnecessary bin collection points that in turn has impact on time and cost so he/she is looking for a better way to handle such scenarios that could help to save time and cost for the government.

For example, if a waste bin is filled and waste scattered. This could lead to poor hygiene. If the manager could be alerted to such situations in real time, he/she could take action quickly and minimize the impact. Also if manager could know the bin fill status in advance then they can create work orders accordingly with the dynamic routes.

Problems

Weak points:
- Static points – collecting half empty and even empty containers
  - Unnecessary collection costs
  - More KM driven
  - More Time spent
- Inefficient equipment utilization
- Overfull containers- Scattered waste
  - Unnecessary cleaning cost
  - Poor hygiene
- More human / vehicle power

Needs:
- I need to monitor available waste collection service vehicles, contact details and their locations.
- I need to know when a waste bin fills along with its locations.
- I need find filled waste bins on daily basis for waste collection that avoids waste overflow.
- I need to avoid static routes and find dynamic routes for waste collection.
- I need to know the ways to save time and cost for waste management.
**Scope**

Intelligent Waste Management Application aims to reduce the time that the trucks are on public roads, achieving greater efficiency of the time these vehicles operate. In particular, the specific objectives of the application are:

- Analyze and develop a system to detect and generate notification to the need to waste collection point.
- Mobile friendly application to track the filled garbage collection points with effective route navigation to travel destination by reducing time and distance.

**Solution and Lifecycle:**

**Stake holders:**
- Waste collection service vehicle driver
- Sensor based garbage collection box at specified locations
- Supervisor/ Manager /Vendors (Hotels /industry)/Individuals

**Action points:**
- Fix sensor based bins at the specified locations
- Real time container status monitoring using battery powered wireless/GPS sensor devices
- Container level reading sent to HANA system
  - Fill level/Temperature/Location monitoring and predictions
- Daily, list out the filled bin or bins that reached certain threshold level
- Provide the collections points and optimized route to waste collection vehicle driver

**Threshold levels for waste bin fill status**
- Red (Filled 90% +)
- Yellow (Filled 75+)
- Green (Up to 75%)

**Analyze Data: HANA**
- Bin sensor data
- Bin locations
- Available service vehicles
- Optimized dynamic routes

**End Results:**
- i. Lower costs
- ii. Better environment
- iii. Time & energy save
- iv. Less scattered waste

**Business Model:**
Subscription service for hotel and industry vendors → Request for waste collection in mobile app
Persona

Andrew - The Municipal Corporation Manager

“I like to get things done quickly by monitoring waste management effectively that saves time and cost to the government.”

About

- 30, married, 5 years of waste management experience.
- Control and monitor team to clean the city by collecting waste from various locations.
- Very mobile and friendly.
- I work with engineers, supervisors and waste collection service vehicle drivers.

Responsibilities

- I am responsible for keeping the city clean by managing waste collection and recycling it.
- I am responsible for multiple projects per week and daily work order assignment.
- I spend more than half of my time with engineers and service provider for waste management.
- I enter time once a month on a project by project basis.

Main Goals

- Keep the city clean.
- To provide better hygiene by avoiding any kind of waste overflow in any locations of the city.
- Better waste management and recycling.
- Time and cost save for effective waste management.

Needs

- I need to monitor available waste collection service vehicles, contact details and their locations.
- I need to know when a waste bin fills along with its locations.
- I need find filled waste bins on daily basis for waste collection that avoids waste overflow.
- I need to avoid static routes and find dynamic routes for waste collection.
- I need to know the ways to save time and cost for waste management.

Pain Points

- Unable to know the fill status of the waste bins located at various locations of the city.
- Work order tracking and analysis.
- Static points – collecting half empty and even empty containers | Unnecessary collection costs
  - More KM driven
  - More Time spent.
- Inefficient equipment utilization
- Overfull containers - Scattered waste | Unnecessary cleaning cost
  - Poor hygiene
- More human / vehicle power

User: Municipal Corporation Manager
Need: Application for effective waste management
Why: To keep city clean with better hygiene in less time, less human power and less cost.
Point of view

As a Municipal Corporation Manager, I need a way to,

- Monitor waste bins with fill status along with their locations
- Track available waste collection service vehicles for work order assignment
- Find waste bins filled more than 90% which needs immediate attention to avoid waste overflow
- Dynamic route map to the collection points based on waste collection points
- Waste bins that are expected to be filled (Prediction capability)
- Mobile friendly application
- Easy way to assign work order to the service provider.
- Notify critical actions to be taken
- Statistical analysis capability to monitor all the above points, so that city can be kept clean with better hygiene in less time/less human power/less cost.

UX Journey: Collecting waste from waste bins

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>Manager assigns work order to the service vehicle driver</th>
<th>Vehicle driver receives work order</th>
<th>Look at all the collection points and their locations in the work order</th>
<th>Collect waste from all the collection points whether filled or not filled</th>
<th>Waste collected from all the collection points.</th>
<th>Move collected waste to recycling point.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINDSET</td>
<td>Ahu I need to analyze on waste collection points</td>
<td>Yes, I got my work order!</td>
<td>Which is the best route to fallow?</td>
<td>No, some waste bins are not at all filled</td>
<td>Took longer than expected due to unnecessary collections</td>
<td>Finally, all collections points are covered.</td>
</tr>
<tr>
<td></td>
<td>I need to assign work orders to the service vehicle drivers.</td>
<td></td>
<td>From which collection point location to start with?</td>
<td>Some waste bins are scattered and it's really pain to handle overflowed waste bins.</td>
<td>There should have been a way to find out filled waste bins.</td>
<td>Work order is completed.</td>
</tr>
<tr>
<td>FEELING</td>
<td>😊</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Updated the same to manager.</td>
</tr>
<tr>
<td></td>
<td>😞</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It took more time; manager is not happy with it.</td>
</tr>
<tr>
<td>TOUCH POINTS</td>
<td>Waste bin location points</td>
<td>Collection point locations</td>
<td>Start point and end point</td>
<td>Filled bins</td>
<td>More Time</td>
<td>Work order completion</td>
</tr>
<tr>
<td></td>
<td>Work order</td>
<td>Static points</td>
<td>Static route</td>
<td>Unfilled bins</td>
<td>More Cost</td>
<td>Notify manager</td>
</tr>
<tr>
<td></td>
<td>Analysis</td>
<td></td>
<td></td>
<td>Hygiene</td>
<td>More KM’s driven</td>
<td>Time delay</td>
</tr>
</tbody>
</table>
Prototype

Mockup Screens

i. Start page of the application

ii. Overview on smart waste bins and collection points

iii. Smart bin sensor data

iv. Available service vehicles
v. Waste collection service vehicle stats

vi. Work order creation

vii. Statistics

viii. Critical Notifications Overview
**BUILD Prototype Links**

Category: Smart City

BUILD Prototype Links:
Desktop:  
https://standard.build.me/api/projects/e80a0ffd9398d1f00cc7524e/prototype/snapshot/latest/index.html#/14766901314209842_S0

Tablet:  
https://standard.build.me/api/projects/e80a0ffd9398d1f00cc7524e/prototype/snapshot/latest/index.html#/14766901314209842_S0

Mobile:  
https://standard.build.me/api/projects/e80a0ffd9398d1f00cc7524e/prototype/snapshot/latest/index.html#/14766901314209842_S0

Images used are representative purpose.

**Sources:** Google Images  
Vehicle/Sensor/Waste bin/Order management/Statistics/Alert

Thank you 😊