# GREEN THE MAP:
# AN EFFICIENT WASTE MANAGEMENT SYSTEM

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**Abstract -** The project entitled "Green The Map", as the name implies, aims at having a cleaner environment, free of garbage and black spots. Environmental protection has attained utmost importance in this era. Using the latest technological domains such as IoT, ML and Image Processing and by applying various deterministic models and objective algorithms, along with modernistic approach using Web Development, we are trying to tackle the above said problem. This project provides an end-to-end solution right from detecting the garbage dumps by monitoring the quality of air and density of the dumps, employee engagement, installing smart bins and cameras till the transportation of wastes and proper handling of the wastes.

## 1. INTRODUCTION

Garbage, trash, rubbish or refuse is waste material that is discarded by humans, usually due to a perceived lack of utility. The term generally does not encompass bodily waste products, purely liquid or gaseous wastes, or toxic waste products. Garbage is commonly sorted and classifies into kinds of material suitable for specific kinds of disposal. Waste can be solid, liquid, or gas and each type have different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological and household. In some cases, waste can pose a threat to human health.

Waste management practices are not uniform among countries (developed and developing nations), regions (urban and rural areas), and residential and industrial sectors can all take different approaches.

A large portion of waste management practices deal with municipal solid waste (MSW) which is the bulk of the waste that is created by household, industrial, and commercial activity. Everyday around 4200 tonnes of garbage is generated in Bangalore alone, out of which only 3400 tonnes reaches the landfills. Rest 900 tonnes are left unaccounted and reach the black spots in the city. Detection, monitoring and management of wastes is one of the primary concerns right now to save our planet. There are mainly three types of spots in the present garbage management system.

- Collection Spot
- Transferring Spot
- Black Spot

Collection spot is a spot from where the garbage is collected from each and every household in the city. Transferring spot is the spot where the garbage collected from the collection spot is transferred to a bigger truck. These bigger trucks then transfer the garbage to the landfills in the city outskirts.

A garbage spot qualifies as a black spot even if it is cleared daily, because it is a symptom of inefficiency of garbage collection system and neat solutions.

Garbage is a main issue plaguing the city. It is a menace which has been spreading all over the country, something that we are in dire need to get rid of. It is high time that we combat the issue and address it effectively. Keeping in mind the same, by exploiting ML and IoT technologies, through this project, we are trying to build an efficient and a unique system to eradicate black spots deal with and control the garbage.

## 2. CHALLENGES

- Young minds of today should be more inciting towards proper garbage disposal the way they are socially engaged.
- Instances like taking such projects as fun is a common happenstance. Even for building such project, dedication is required along with fun.
- Monitoring the air quality 24/7 and acting on the same can be quite a challenging task. But done rightly, it can be the most effective measure in eliminating black spots.

## 3. MOTIVATION

- Manual systems in which employees clear the dumpsters in not-so-periodic manner.
- No systematic approach towards clearing the black spots.
- Unclear about the status of a particular location where black spots are generated.
- Less effective in man power as well as in ways incorporated in cleaning the dumps.

## 4. OBJECTIVES

- To overcome the difficulty in handling the cleaning of garbage dumps done in a complete manual way.
- Maximizing the elimination of such black spots and taking appropriate measures against the people responsible for the same.
- To make sure that these wastes are managed in an intelligent manner.
- To reduce the impact of these dumps on the living environment.

## 5. METHODOLOGY:

- The technologies we are implementing in this project are IOT, Machine Learning for Garbage Detection.

**Devices used:**

- MQ135 sensor for monitoring the quality of air surrounding the dump.
- IR sensor fixed in the trucks to estimate the density of the dump.

**Softwares used:**

- Open CV for ML and Image processing for Garbage detection.
- Python language for coding ML part.
- MySQL database for Database Management System of the cleansed and garbage areas.
- Wamp Server to store the database and operate the website.

### 5.1 CRITICAL DEPARTMENT (Phase 1)

MQ135 sensor → IFTTT → APP → OPEN CV (IMAGE PROCESSING)

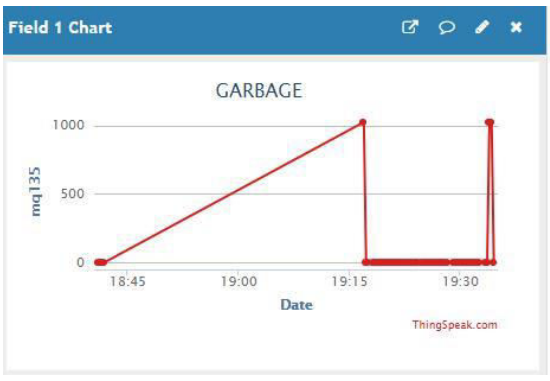


**Fig 5.1:** Readings of MQ135 sensor

- Garbage will be monitored using MQ135 sensor.
- If the value is more, then using the IFTTT portal we will be sending notifications to the officials telling then about the critical condition.
- Using the app the BBMP officials can update regarding the type of waste or garbage which is being thrown.

After cleaning the black spots a CCTV will be installed to prevent any further loitering.

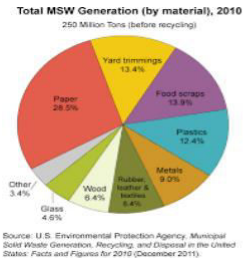


**Fig 5.2:** Garbage Density
**Fig 5.3:** Installation of cameras

## 5.2 CRITICAL DEPARTMENT (Phase 2)

- We will be using an app, where a person can click an image of a person throwing wastes and upload it into our database.
- Measures will be taken by the officials to fine the particular individual if found guilty.

MOBLIE APPLICATION → FRS → DATABASE

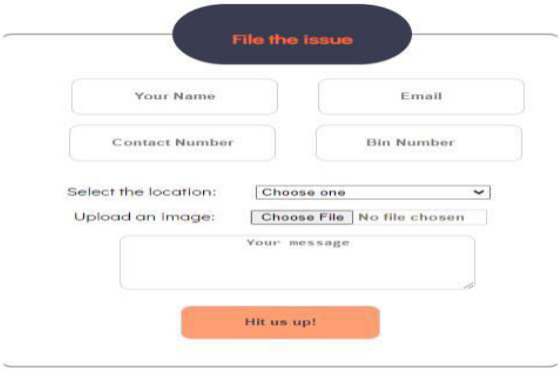


**Fig 5.4:** Platform where users can file their complaints

**Fig 5.5:** Garbage bins
**Fig 5.6:** Awareness campaign

## 5.3 SUPERVISORY DEPARTMENT

- In this department we will be using smart bins to detect whether the garbage in filled or not.
- We will notify the officials using and app or a speaker.

IR Sensor ⟶ ThingSpeak Cloud ⟶ Notification

While cleaning the black spot the officials need to report as to what are majority of the waste which is thrown so that we can use the data to segregate the wastes and we will use the data to take measures like, consider that the garbage consist of 80% plastic, then strict measures to reduce the amount of plastic in the locality will be taken. The other type of waste which can be include are plastic, toxic and non-toxic etc. The toxic materials which degrade the environment can be rendered non-toxic with appropriate measures. And finally, the garbage can be dumped in the plants outside the city and thus the black spots can be cleared in an effective manner. Various futuristic prospects like incineration of wastes etc can be undertaken.

After taking all the above measures in a particular locality we can send the locality and the data accordingly to the Supervisory department. Under this department the following measures are further taken.

1) We will install Smart Bins at the end of each street. Smart Bins are the bins which will notify the garbage truck and the officials who are responsible for collecting the garbage that the bins are full and they need to be collected and emptied.

2) At times the pick-up trucks might get delayed and so the residents may end up overflowing the bins.

   In that case, garbage bins being smart bins, a siren will be rung to alert the nearby residents and a camera which is attached to the bin will be activated. Therefore, not allowing the resident to throw the garbage near the bins.

3) The bins will be divided into 3 types:

   i. Waste bin (red lid)
   ii. Organics bin (green lid)
   iii. Recycling bin (yellow lid)

4) And this department will supervise and make sure that there are no chances for new black spot to occur in that locality and the residents are following the rules and regulations which are imposed by the BBMP officials.

In addition to these toils, this department will also conduct awareness campaign regarding waste management.

## 6. CONCLUSION

Green the map project mainly focuses on clearing the garbage black spots in the city. This project aims to overcome the difficulty in handling the cleaning of garbage dumps and thus reducing the harmful impact of these dumps on the environment.

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