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Fake Feedback Identification System for Public Toilets

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Abstract - *Under the Swachh Bharat Abhiyan, many initiatives are being taken by the Indian government. to give clean and hygiene toilets to the citizens. Central Govt has come up with the 'Swachhata App' for the citizens to post their grievances related water, electricity/cleaning and blockages in public toilets. On the similar line we are giving e-platform for the citizens to post their complaints related to community toilets. Many times, the caretakers/managers of CT, PT have to run through each complaint and have to check the status manually. It becomes very tedious for the maintenance person to segregate the fake and genuine complaints/feedbacks as citizens may post false feedback just for the sake of fun.*

In our proposed system we have devised the mechanism to segregate them based on the IOT concept and verification of the same with the real time data captured through sensor. We focus on the availability of water, electricity, identifying the defuncts unit, and the cleanliness of the block, we have implemented the IOT based mechanism and segregate them in fake and genuine.

Key Words: **IOT, Public Toilets, Cleanliness, Fake Feedback.**

1. INTRODUCTION

A public toilet is a room or small building with toilets (or urinals) and sinks that do not belong to a particular household. In fact, the toilet can be used by the general public, by customers, travelers, employees of a company, school children, prisoners, etc. Some public restrooms are unisex, especially small or single-occupancy facilities. Male and female facilities are often divided apart. Increasingly, disabled people can also access public toilets.

This project deals with the segregation of Fake Feedback collected from the user. There is not enough information about toilet use in our country. Many diseases result, including malaria, hepatitis, influenza, cholera, streptococcal infections, typhoid, etc. So, we thought of making a smart toilet using some common sensors. The project is based on IOT concepts using different sensors like MQ-135 (smell) sensor, ultrasonic sensor, IR sensor and current sensor, to detect the cleanliness, availability of water, defunct units and electricity, respectively.

1.1 Problems in PT's

Dirty, disgusting, sloppy- typically, these are some of the nicer adjectives that strike us when we are reminded of an Indian public toilet. Each of us has been compelled to use one at some point in our lives promising ourselves that we wouldn't put our bodies through that unsanitary experience ever again

- It will be too filthy and unclean.
- There is no water flowing from the tap.
- No Electricity/Light is not working.
- The broken doors, floor, roof, tap, basin etc.

2. Problem Statement

To segregate the fake and genuine feedback collected from the user as feedback.

3. Motivation

In a metropolitan city like Mumbai the people coming in and going out, also referred as a floating population, will be large in number. The municipal corporation do provide sanitation facility in the form of public toilet and community toilets.

The municipal corporation do except the feedback from the users/citizens related to the status of the basic amenities provided, like water, electricity, cleanliness etc, these feedbacks serve as a marker to judge whether the PT operators are maintaining the toilets to maintain cleanliness and hygiene in the toilet block.

Many times, the citizen does not provide the genuine feedback either intentionally or due to negligence and unaware of the importance the feedback in governance.

Since, there are lakhs of people visiting the toilet blocks, there is also a possibility of getting feedbacks also in huge number. In order to reduce the burden on the caretaker or PT operator, we would like to propose an IOT based mechanism to segregate feedbacks and address only genuine feedbacks only.

4. Scope

Fake Feedbacks are categorized as any kind of cooked up reviews with an intention to deceive or to mislead. In this report we are trying to present the solution for fake feedback identification and segregate them by using some machine learning techniques as well as by using some sensors which will increase the accuracy of the results.

This project can decrease the workload of the sweeper. Before the sweeper would have to regularly check out all the things that are working in the toilet, but after the implementation of the project the sweeper will only be present there whenever there is need. This project will decrease the cleanliness issues of the toilet which automatically decreases the health issues by which common people are suffering from.

5. PROPOSED SYSTEM

5.1 Introduction

To detect the genuineness of the feedback we compare the real time data with the sensor data within the window period and label them as fake and genuine.

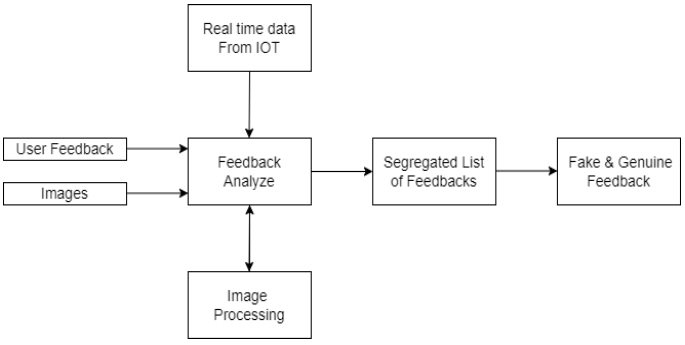
Any user who has downloaded an app can give feedback user need not register himself on the app. [6]

5.2 Types of Feedbacks

User will be able to give feedback for the following amenities.

1. Water availability
2. Electricity availability
3. Cleanliness of the toilet
4. Defunct units
5. Infrastructure like door, window, latching system, exhaust fan, tube light, vending machine, etc.

The architecture of the proposed system is given below.



5.3 Proposed System

Our mechanism is divided into 2 parts,

In first part, we are to identifying genuine feedbacks using the IOT consisting of various sensors.

In the second part, we are making use of Image processing technique to categorize the images sent by the users, into fake or genuine.

The types of sensors used are ultrasonic for level detection, IR for defunct unit identification, MQ-135 for Ammonia level detection and current sensor for availability of electricity and images to know the major or minor structural damages.

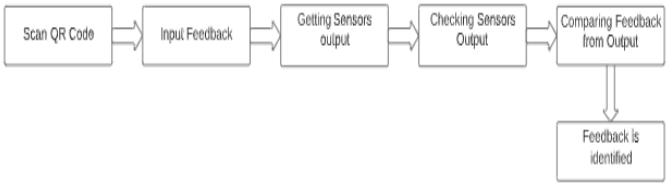
We collect the feedback in the form of text and images.

A. Feedback identification using Sensors.

Categorization using IOT:

We use the following sensors to categorize the feedbacks such as availability of water electricity, cleanliness of toilet, Defunct unit and Air quality.

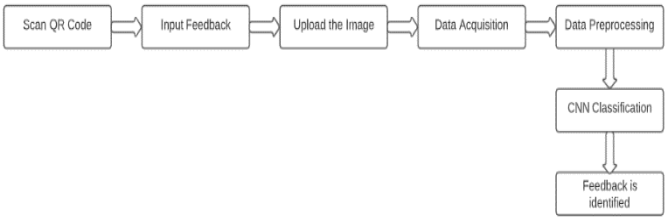
a. Water availability – Ultrasonic
b. Electricity – LDR
c. Defunct Unit – IR
d. Air quality – MQ-135.



B. Feedback identification using Image Processing Techniques

Categorization using Images:

Users are given the facility to upload the images of the door/sink/towel-bolt or any other infrastructure related issues. So, looking at the images we can categorize them into fake and genuine. Even looking at damages, a caretaker can plan the maintenance activities.



The steps in the image processing technique are as follows:

1. Initially the image from the user will be collected and will be stored.

2. After storing we will be implementing algorithms which will give us the crack percentage as an output.

3. Their will be also a threshold value for the crack percentage.

4. Based on the crack percentage and the threshold value, the feedbacks will be identified and segregated.

6. HARDWARE IMPLEMENTATION

The following section describes the implementation of IOT, the platform developed for collecting the real time sensor data from the toilet block.

A. IOT platform to collect the real time data.

We have developed the IOT based system to detect the level of water, electricity, defunct units and cleanliness.

1. IOT plaform – front view

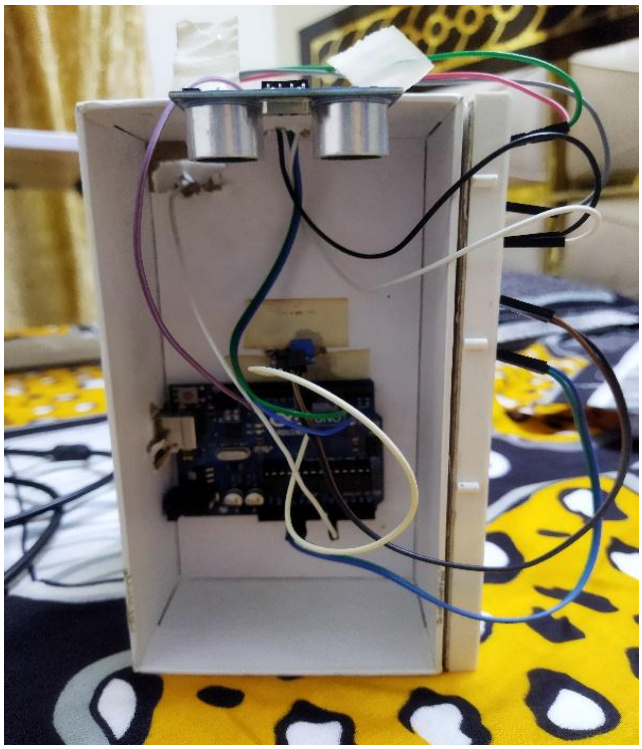


Fig 6.A.1

Figure 6.A.1: IOT platform for collecting the real-time data. (A frony view of IOT platform), Shows the ouput of the system based on the ultrsonic sensor which is used to detect the level in the tank. O/P signals are continuous signals recorded every 20 mintes. [2]

2. IOT platfrom – rear view

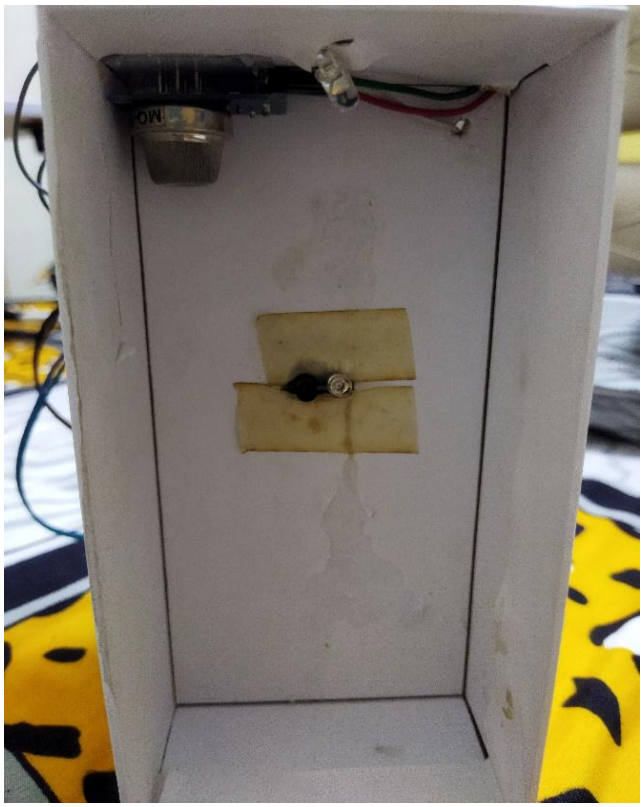


Fig 6.A.2

Figure 6.A.2: IOT platform for collecting the real-time data. (A rear view of IOT pltform), Shows the ouput of the system based on the MQ-135 sensor to detect the presence of Ammonia and other gases AND IR sensor to detect the entry and exit of the person inside the unit. The O/P signal is cotinuous signal captured with time interval of every 20 minutes. [3][5].

3. Methodolgy

1. Ultrasonic sensors are used for measuring water levels, transmitting sound waves from the surface of the water to the sensor, which detects that level, and based on that value of the level, the system isolates the feedbacks based on comparison to a threshold value. [2]

2. MQ135 sensor will detect the quality of air present in public toilet. It can detect gases like ammonia, sulphur, carbon dioxide and so on. MQ135 will give output as value based on threshold value of MQ-135 to check quality of air from which we will be able to identify if the odour is present or not and system will be able to segregate feedbacks respectively. [3]

3. IR sensor is fixed at the Top of entry of Unit. IR sensor will detect the motion (entry as well as exit) of an object or user

and will give the In-time and Out-time of the user and with the help of the output system will take difference of Out-time and In-time and based on that difference, system will be able to segregate feedback into fake and genuine. [5]

B. Categorization using Images.

We have developed the Image processing system to detect the condition of the infrastructure. So, looking at the image we can get the status of infrastructure. [7]

For crack detection, we will use set of operations such as

- Load rgb image of surface
- Contrast stretch
- Convert rgb to gray scale
- Image segmentation
- Morphological operations (thin, clean, fill, etc..)

We can tell if the door is cracked or not based on the proportion of crack is detected.

And with the following result we have compared it with the feedback of the user and got the result that the feedback is fake or genuine.

Fig 6.B.1

Figure 6.B.1 Shows the Output of the system based on image processing which shows the cracked door from sides.
is used to detect the structural damage, cracks, broken door, broken ledge.

7. RESULTS & DISCUSSION

Following results depicts the segregation of the feedbacks based on the real time data collected from the IOT platform:

	Time Stamp	Level	Feedback	status
0	2021-01-05 00:00:00	67	1	Feedback is Fake
1	2021-01-05 00:20:00	59	1	Feedback is Fake
2	2021-01-05 00:40:00	44	1	Feedback is Fake
3	2021-01-05 01:00:00	26	1	Feedback is Fake
4	2021-01-05 01:20:00	8	1	Feedback is Genuine
5	2021-01-05 01:40:00	8	1	Feedback is Genuine
6	2021-01-05 02:00:00	18	1	Feedback is Genuine
7	2021-01-05 02:20:00	18	1	Feedback is Genuine
8	2021-01-05 02:40:00	7	1	Feedback is Genuine
9	2021-01-05 03:00:00	9	1	Feedback is Genuine
10	2021-01-05 03:20:00	26	1	Feedback is Fake
11	2021-01-05 03:40:00	38	1	Feedback is Fake
12	2021-01-05 04:00:00	47	1	Feedback is Fake
13	2021-01-05 04:20:00	51	1	Feedback is Fake
14	2021-01-05 04:40:00	51	1	Feedback is Fake
15	2021-01-05 05:00:00	48	1	Feedback is Fake

Fig 7.1

Figure 7.1: Segregation of feedback related to the water availability, Above ouput shows the level of water in the tank in time interval of every 20 minutes.

	Time Stamp	Output	Feedback	status
0	2021-01-05 00:00:00	1	1	Feedback is Fake
1	2021-01-05 00:20:00	1	1	Feedback is Fake
2	2021-01-05 00:40:00	1	1	Feedback is Fake
3	2021-01-05 01:00:00	1	1	Feedback is Fake
4	2021-01-05 01:20:00	1	1	Feedback is Fake
5	2021-01-05 01:40:00	0	1	Feedback is Genuine
6	2021-01-05 02:00:00	1	1	Feedback is Fake
7	2021-01-05 02:20:00	1	1	Feedback is Fake
8	2021-01-05 02:40:00	0	1	Feedback is Genuine
9	2021-01-05 03:00:00	1	1	Feedback is Fake
10	2021-01-05 03:20:00	0	1	Feedback is Genuine
11	2021-01-05 03:40:00	0	1	Feedback is Genuine
12	2021-01-05 04:00:00	1	1	Feedback is Fake
13	2021-01-05 04:20:00	1	1	Feedback is Fake
14	2021-01-05 04:40:00	1	1	Feedback is Fake

Fig 7.2

Figure 7.2: Segregation of feedback related to electricity, Above output shows that whether the electricity is present or not in time interval of every 20 minutes.

	Time Stamp	Ammonia (%)	Methane (%)	Feedback	status
0	2021-01-05 00:00:00	67	18	1	Feedback is Genuine
1	2021-01-05 00:20:00	59	7	1	Feedback is Genuine
2	2021-01-05 00:40:00	44	9	1	Feedback is Genuine
3	2021-01-05 01:00:00	26	26	1	Feedback is Genuine
4	2021-01-05 01:20:00	8	15	1	Feedback is Fake
5	2021-01-05 01:40:00	8	18	1	Feedback is Fake
6	2021-01-05 02:00:00	18	12	1	Feedback is Fake
7	2021-01-05 02:20:00	18	51	1	Feedback is Genuine
8	2021-01-05 02:40:00	7	11	1	Feedback is Fake
9	2021-01-05 03:00:00	9	19	1	Feedback is Fake
10	2021-01-05 03:20:00	26	67	1	Feedback is Genuine
11	2021-01-05 03:40:00	38	59	1	Feedback is Genuine
12	2021-01-05 04:00:00	47	44	1	Feedback is Genuine
13	2021-01-05 04:20:00	51	26	1	Feedback is Genuine
14	2021-01-05 04:40:00	51	8	1	Feedback is Genuine
15	2021-01-05 05:00:00	15	8	1	Feedback is Fake

Fig 7.3

Figure 7.3: segregation of feedback related to presences of air quality, Above output shows the percentage of ammonia and methane gas present in the PT.

We have made three units from which we can get the status of unit whether it is functional or not.

1st Unit:

	Time Stamp	In-time	Out-time	Feedback	diff_seconds
0	2021-01-05 00:00:00	2021-01-05 00:00:00	2021-01-05 00:05:00	1	300
1	2021-01-05 00:20:00	2021-01-05 00:20:00	2021-01-05 00:20:30	1	30
2	2021-01-05 00:40:00	2021-01-05 00:40:00	2021-01-05 00:47:00	1	420
3	2021-01-05 01:00:00	2021-01-05 01:00:00	2021-01-05 01:00:20	1	20
4	2021-01-05 01:20:00	2021-01-05 01:20:00	2021-01-05 01:25:00	1	300
5	2021-01-05 01:40:00	2021-01-05 01:40:00	2021-01-05 01:40:25	1	25
6	2021-01-05 02:00:00	2021-01-05 02:00:00	2021-01-05 02:00:20	1	20
7	2021-01-05 02:20:00	2021-01-05 02:20:00	2021-01-05 02:26:00	1	360
8	2021-01-05 02:40:00	2021-01-05 02:40:00	2021-01-05 02:44:00	1	240
9	2021-01-05 03:00:00	2021-01-05 03:00:00	2021-01-05 03:18:00	1	1080

```
arr=df["diff_seconds"].values
# print(arr)
count=0
for i in range(len(arr)):
  if (arr[i]<=30):
    count=count+1
print(count)
```

```
15
```

```
if (count<=15):
  print("First Unit is Functional")
else:
  print("First Unit is Not Functional")
```

```
First Unit is Functional
```

Fig 7.4

Figure 7.4: Segregation of feedback related to unit whether it is functional or not., Above output shows that the 1st unit is fucntional or not with the help of in-time and out-time.

2nd Unit:

	Time Stamp	In-time	Out-time	Feedback	diff_seconds
0	2021-01-05 00:00:00	2021-01-05 00:00:00	2021-01-05 00:00:20	1	20
1	2021-01-05 00:20:00	2021-01-05 00:20:00	2021-01-05 00:20:30	1	30
2	2021-01-05 00:40:00	2021-01-05 00:40:00	2021-01-05 00:47:00	1	420
3	2021-01-05 01:00:00	2021-01-05 01:00:00	2021-01-05 01:00:20	1	20
4	2021-01-05 01:20:00	2021-01-05 01:20:00	2021-01-05 01:25:00	1	300
5	2021-01-05 01:40:00	2021-01-05 01:40:00	2021-01-05 01:40:25	1	25
6	2021-01-05 02:00:00	2021-01-05 02:00:00	2021-01-05 02:00:20	1	20
7	2021-01-05 02:20:00	2021-01-05 02:20:00	2021-01-05 02:26:00	1	360
8	2021-01-05 02:40:00	2021-01-05 02:40:00	2021-01-05 02:44:00	1	240
9	2021-01-05 03:00:00	2021-01-05 03:00:00	2021-01-05 03:00:15	1	15

```
arr=df1["diff_seconds"].values
# print(arr)
count=0
for i in range(len(arr)):
  if (arr[i]<=30):
    count=count+1
print(count)
```

```
35
```

```
if (count<=15):
  print("Second Unit is Functional")
else:
  print("Second Unit is Not Functional")
```

```
Second Unit is Not Functional
```

Fig 7.5

Figure 7.5: Segregation of feedback related to 2nd Unit whether it is functional or not with the help of in-time and out-time.

3rd Unit:

	Time Stamp	In-time	Out-time	Feedback	diff_seconds
0	2021-01-05 00:00:00	2021-01-05 00:00:00	2021-01-05 00:05:00	1	300
1	2021-01-05 00:20:00	2021-01-05 00:20:00	2021-01-05 00:20:30	1	30
2	2021-01-05 00:40:00	2021-01-05 00:40:00	2021-01-05 00:47:00	1	420
3	2021-01-05 01:00:00	2021-01-05 01:00:00	2021-01-05 01:00:20	1	20
4	2021-01-05 01:20:00	2021-01-05 01:20:00	2021-01-05 01:25:00	1	300
5	2021-01-05 01:40:00	2021-01-05 01:40:00	2021-01-05 01:40:25	1	25
6	2021-01-05 02:00:00	2021-01-05 02:00:00	2021-01-05 02:15:00	1	900
7	2021-01-05 02:20:00	2021-01-05 02:20:00	2021-01-05 02:26:00	1	360
8	2021-01-05 02:40:00	2021-01-05 02:40:00	2021-01-05 02:44:00	1	240
9	2021-01-05 03:00:00	2021-01-05 03:00:00	2021-01-05 03:18:00	1	1080

```
arr=df1["diff_seconds"].values
# print(arr)
count=0
for i in range(len(arr)):
  if (arr[i]<=30):
    count=count+1
print(count)
```

```
8
```

```
if (count<=15):
  print("Third Unit is Functional")
else:
  print("Third Unit is Not Functional")
```

```
Third Unit is Functional
```

Fig 7.6

Figure 7.6: Segregation of feedback related to 3rd Unit whether it is functional or not with the help of in-time and out-time.

8. CONCLUSION

We have successfully implemented the IOT based feedback segregation mechanism for the operation and maintenance team of the Public Toilets.

This mechanism reduces the workload of the caretaker and helps them maintain the PT clean and hygienic. The same can be further extended to detect the damages /functional condition of all the ammenties in any public toilet block which can be used to give satisfactory services to the citizens.

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