City Garbage collection indicator using RF(Zigbee) and GSM technology

In our city many times we see that the garbage bins or dustbins placed at public places are overflowing. It creates unhygienic conditions for people. Also it creates ugliness to that place. At the same time bad smell is also spread. To avoid all such situations we are going to implement a project called **City Garbage collection indicator using RF and GSM technology**.

In these dustbin are interfaced with microcontroller based system having IR wireless system.

These Dustbin are interfaced with the central System showing status of garbage in Dustbins on GUI.

If the dustbin are loaded with garbage the status will display on screen. If the dustbin are not cleaned in specific time then SMS will be send to the person informing that dustbin are not cleaned yet. At the same status report will be updated so that the sweeper for contractor responsible for the cleanliness can be question for the delay. Hence an automatic system can be designed to maintain the city Clean with the help of electronics.

We have observed that the municipal officer or the government authorized person will monitor the status of dustbin. Or generally we see that they have a regular schedule of picking up these garbage bins or dustbins. This schedule varies as per the population of that place. It can be once in a day or twice in a day or in some cases once in two days. However we see that in case there is some festival or some function, lots of garbage material is generated by people in that particular area. In such cases the garbage dustbin gets immediately full and then it overflows which creates many problems. So in situations, with help of our project the government authority person can get SMS immediately. So they will get SMS before their periodic interval visit of picking up the dustbin. Then they can go and pick up the dustbins.
IR (Infra Red) Sensor for Detection of Garbage Level

Infrared beam barrier and a proximity detector circuit with IC 555 infrared detector circuit

![Circuit Diagram]

The circuit uses the very popular Sharp IR module. NOS pin. circuit is shown in the Sharp and Panasonic modules. For other modules please refer to the relevant datasheets.

The receiver consists of a 555 timer IC working as an oscillator at about 38Khz (also works from 36kHz to 40kHz), which must be configured using the standard 10K. The duty cycle of the IR beam is about 10%. This allows us to more current through the LED, allowing a greater range.

The receiver uses a sharp IR unit. If the IR beam from the transmitter IR drops, the output is activated, which activates the relay and turns off
when the beam is blocked. The relay contacts can be used to turn ON / OFF alarm, lights etc. The 10K advance should be adjusted until the receiver detects the IR beam.

The circuit can also be used as a proximity sensor that garbage in front of the device detects without obstructing a IR beam. So the LED has the same direction as the IR module and at the same level. The proposed scheme is shown in diagram. The LED should be adequately covered with a reflective material like glass or aluminum plates on the sides to stop the spread of the IR beam to prevent and get a sharp focus the beam.

When there is nothing for them, the IR beam reflected on the unit and therefore the circuit is not activated. When an garbage level is reached, the infrared light from the LED reflected from the garbage level on the unit and therefore the circuit is activated.
Transmitter Circuit

Micro Controller 89V51RD2

IR Sensor of Different City DustBin
Receiver Circuit

Microcontroller / PC

GSM Module

GSM Modem
Modification is it will displayed on Screen of PC Like this

City Garbage collection indicator using RF and GSM technology

<table>
<thead>
<tr>
<th>Location</th>
<th>Dust Bin Status</th>
<th>Date</th>
<th>Time</th>
<th>Mobile No</th>
<th>Text Message for Cleaner</th>
<th>Dust Bin Full/Empty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location1</td>
<td>Cleaned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location2</td>
<td>NotCleaned</td>
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<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location4</td>
<td>NotCleaned</td>
<td></td>
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<td></td>
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</tbody>
</table>
Component List of Transmitter and Receiver Section

**Semiconductors:**
- IC1: HT12E Holtek encoder
- IC2-IC5: MCT2E optocoupler
- IC6: HT12D Holtek decoder
- IC7: 74LS138 1-of-8 decoder
- IC8: ULN2803 Darlington array
- IC9-IC12: CD4013 flip-flop
- IC13: CD40106 hex inverter
- T1-T9: BC548 npn transistor
- D1-D4: 1N4148 switching diode
- D5-D14: 1N4007 rectifier diode
- TX1: TX-433 RF transmitter
- RX1: RX-433 RF receiver
- LED1: 5mm LED

**Resistors (all 1/4-watt, ±5% carbon):**
- R1: 1-mega-ohm
- R2-R5: 10-kilo-ohm
- R6: 100-kilo-ohm
- R7-R10: 100-ohm
- R11: 47-kilo-ohm
- R12: 3.9-kilo-ohm
- R13: 470-ohm
- R14: 1-kilo-ohm
- R15-R22: 2.2-kilo-ohm
- RNW1: 4.7-kilo-ohm, resistor network

**Capacitors:**
- C1, C2: 100μF, 16V electrolytic
- C3: 10μF, 16V electrolytic

**Miscellaneous:**
- RL1-RL8: 6V, 1C/O relay
- BATT.1: 6V battery
- BATT.2: 6V, 4.5Ah battery
- S1, S2: On-off switch
- DIP-SW1: 8-way DIP switch
- DIP-SW2: 8-way DIP switch
  - 25-pin, D-type male connector
Applications and Advantages:
1) To collect dustbins placed at public places in city.
2) This project can also be used in college / university campus
3) This project can also be used in companies
4) Many times Garbage dust bin is overflown and many animals like dog or goat enters inside or near the dustbin. This creates a bad scene. Also some birds are also trying to take out garbage from dust bin. This project can avoid such situations.

Future Development:
1. We can add GPS modem to this project. This will help to track the position in case there are more dustbins.

Contract:
Hindustan Embedded System.
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