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Junk Automation Monitoring in Urbanization Using Universal Object Interaction

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ABSTRACT*:* In recent decades, Urbanization and waste consectary has increased chasm. Waste management has been a major issue in our country. Many times, in our city we see that junk bins or moth bins placed in public places are overloaded. It creates unhygienic conditions for people as well as ugliness to that place which leads to bad smell. This project is an advanced method in which waste management is automated. This system monitors all the moth bins located throughout the city and compare it with junk bins depth. We are going to implement our project by the interface of NodeMCU ESP8266 Wi-Fi board with Ultrasonic Sensor, Gas Sensor and Flame Sensor. The Ultrasonic Sensors are used for the detection of moth bin current status and it is placed at top of the moth bins. Once the junk reaches the threshold level the sensor will trigger the NodeMCU will continuously alert the required District Deputy Director, Municipal Sway and Councilor until the junk in the moth bin is squashed. The Gas Sensor is used to detect the presence of gases in the area, often as part of a safety system. This type of device is important because there are many gases that can be harmful to organic life, such as humans and animals. The Flame Sensor is used to detect and respond to the presence of a flame or fire. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms and it uses to detect the flame. The status will be updated on to the application in real-time. Our aim is to remit human resources and efforts along with the enhancement of a shriek city vision.

KEYWORDS*:* NodeMCU ESP8266 Wi-Fi Board;Ultrasonic sensor;Flame sensor; Gas sensor.

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I. INTRODUCTION

"Swachh Bharat Abhiyan" is a Swachh Bharat mission led by the government of India to make India a clean India. This campaign was launched officially by the government of India on 145th birthday anniversary of the great person, Mahatma Gandhi on 2nd of October, 2014. The father of the nation, Mahatma Gandhi had said that, **"Sanitation is more important than Independence"** during his time before the independence of India. He was well aware of the bad and unclean situation of the India. He had emphasized the people of India a lot about the cleanliness and sanitation as well as its implementation in the daily lives. The basic goals behind launching the Swachh Bharat Mission are to make the country full of sanitation facilities as well as eliminate all the unhealthy practices of people in daily routines.

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From CKCET, we were involved by implementing a computerized monitoring system which can give a remarkable contribution through play a vital role in clean India mission. Universal Object Interaction is one of the technology which focused in the billions of intelligent and sensing devices connected together with the ability of exchanging data between them. The term "Universal Object Interaction" refers to a wireless communication between the objects using Internet with RFID, Sensor, Shriek Tech and Nano Tech. It was first used by "Kevin Ashton" in 1999. The ability to transfer data over a network without needing a Human to Human (H2H), Human to Machine (H2M) and Machine to Machine (M2M) interactions. Nowadays, the population and the waste consectary are increased chasm. Waste management is one of the major issues in our country. We see that the junk bins or moth bins placed at public places as hospitals, shopping malls, institutions, etc. are overloaded. These creates the unhygienic conditions and spread majority of infections because of bacteria and viruses. This project "Junk Automation Monitoring in Urbanization using Universal Object Interaction" is a method to which waste management is automated. This system monitors all the junk bins located throughout the city and measures the depth as whether to be filled or not. We are going to implement our project using the interfaces of NodeMCU ESP8266 Wi-Fi board with Ultrasonic Sensor, Gas Sensor and Flame Sensor. The Ultrasonic Sensor is used to detect the moth bins current status and placed it on top of the bins. The Gas Sensor is used to detect the presence of gases in an area, often as part of a safety system. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. The Flame Sensor is used to detect and respond to the presence of a flame or fire. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms and it uses to detect the flame. The level indicator used to indicate the levels as low, medium and high. If the level reaches high, then the sensor makes continuous SMS alert and also send the status of the bins to Deputy Director, Municipal Swag & Councilor. The application contains the Admin, District Deputy Director, Health Inspector, Municipal Sway, Councilor and People. In admin module used by Main admin and controls all the functionalities. The Municipal Sway module used by sway of municipal and Councilor module used by councilor & can view the level of junk, status of the bins, details of the bins as bin ID, location and update the moth bin details. Our aim is to remit the human resources and efforts along with the enhancement of a shriek city vision.

II. LITERATURE SURVEY

The idea of shriek junk bin has excited for many years. After the development of UOI field, we are finding its grip in our lives. We are using Ultrasonic Sensor, Gas Sensor, Flame Sensor and NodeMCU Wi-Fi Board for transmitting the data. They are many types of waste such as Package waste, Agriculture waste, Inorganic waste, etc. The authors in [1] have made an analysis between the existing moth bins and their population. It shown as the number of existing bins is insufficient in that area. It is found that all the bins are burnt with wastes and also causing the pollution to the environment. The authors in [2] has built framework which contains the camera would be set at each junk collection alongside load cell sensor at base of the trash bin. Camera takes the continuous snapshots of the junk bins. The fill level is set and compares the output of camera and load sensor. In junk monitoring system, the sensors are place in the junk bins which placed at the public place. When the junk level reaches, the indication will give to municipal sway and councilor by alert using Wi-Fi Module. The waste management is built for several elements as waste, domestic bins, trash bags, collective containers and the collecting vehicles. The flow of waste should be start from wastes to end in the collecting vehicles. For junk detection, Ultrasonic sensor is used. This system assures the cleaning of junk bins soon when it reaches the maximum level.

III. SYSTEM ARCHITECTURE

This system is a very innovative system which will help to keep the cities clean. This system monitors the moth bins and collects the level of junk moth bins via a web page. We uses ultrasonic sensor, flame sensor & gas sensor which is placed top of the bins to detect the junk levels, flame & gas levels. The system makes use of LCD display, NodeMCU ESP8266 Wi-Fi board for transmitting data with location. The LCD display is used to display the status of the level of the moth bins.

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The web app is used to show the moth bins current status with location to the government sway to monitoring it. The web app gives a graphical view of the moth bins. The LCD display shows the current status of the junk levels, flame & gas levels. The system gives an alert by the SMS when the level reaches the limit. Thus this system helps to keep city clean by sending the moth bins levels by the graphical image of the bins via a web page.

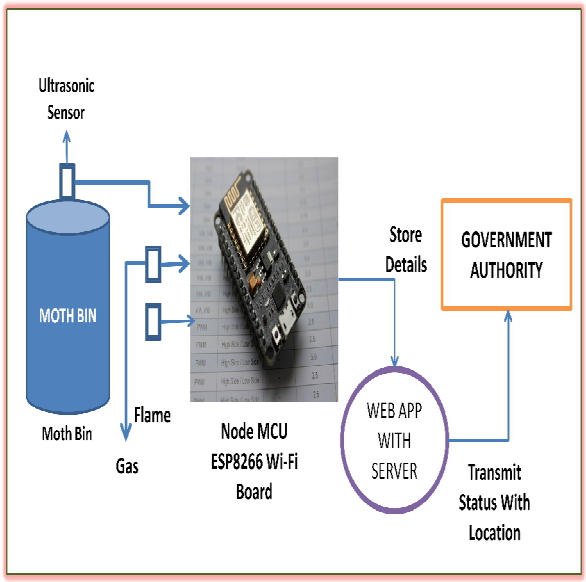

Fig.1: System Architecture.

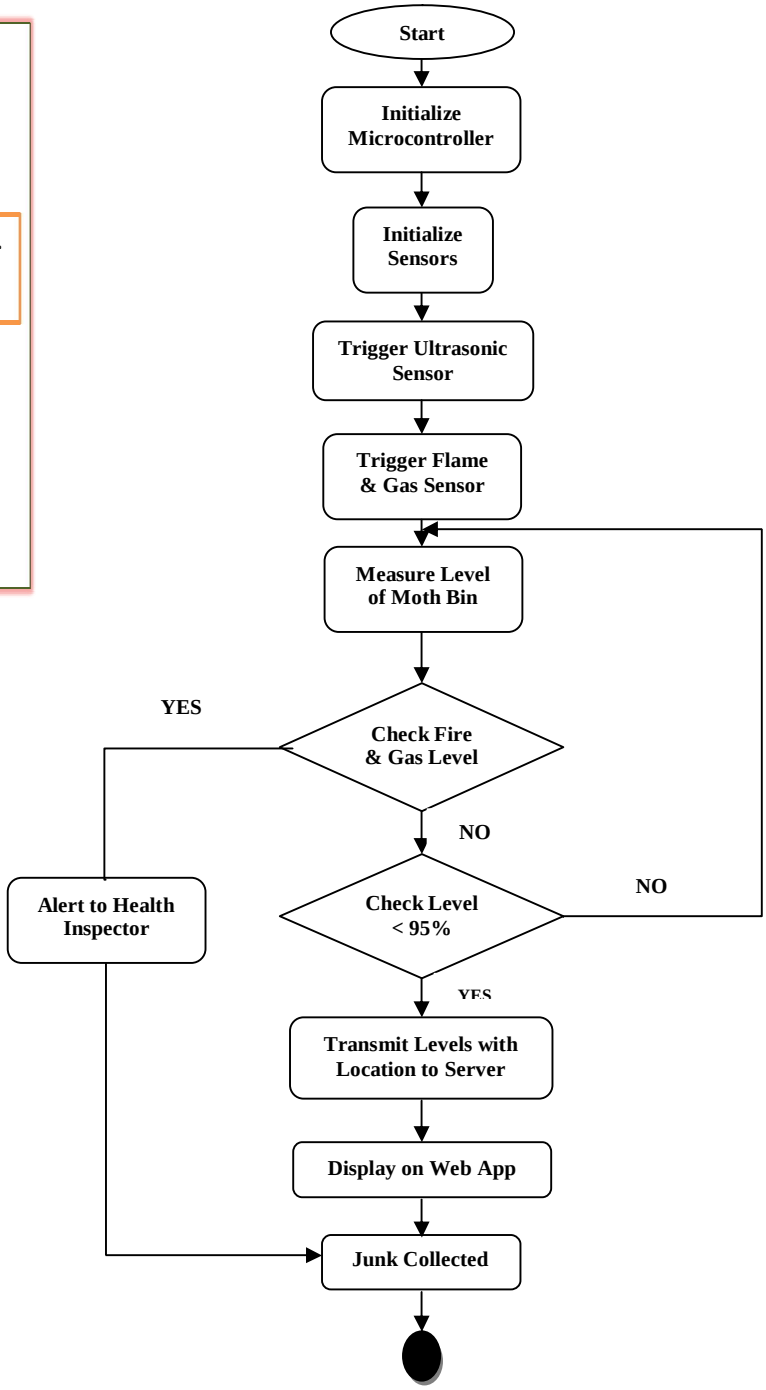

Fig.2: Flowchart.

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HARDWARE COMPONENTS USED

A. *NodeMCU ESP8266 Wi-Fi Board*

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs. NodeMCU was created shortly after the ESP8266 came out. On December 30, 2013, Espressif Systems began production of the ESP8266. The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core,[*citation needed*] widely used in IoT applications. NodeMCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub. Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit v0.9. Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to NodeMCU project, then NodeMCU was able to support the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib to NodeMCU project, enabling NodeMCU to easily drive LCD, Screen, OLED, even VGA displays. In summer 2015 the creators abandoned the firmware project and a group of independent but dedicated contributors took over. By summer 2016 the NodeMCU included more than 40 different modules. Due to resource constraints users need to select the modules relevant for their project and build a firmware tailored to their needs.

B. *Ultrasonic Sensor*

The ultrasonic sensor has two pins: Trigger and Echo, which are used for calculating the distance of the object by generating sound waves and thus calculating the time duration of the echo that is generated. The Ultrasonic Sensor sends out a high-frequency sound pulse and then times how long it takes for the echo of the sound to reflect back. It also known as transceivers when they both send and receive, but more generally called transducers. It works on a principle similar to radar or sonar, which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Active ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions.

C. *Gas Sensor*

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak or other emissions and can interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. Exposure to toxic gases can also occur in operations such as painting, fumigation, fuel filling, construction, excavation of contaminated soils, landfill operations, entering confined spaces, etc. Common sensors include combustible gas sensors, photo ionization detectors, infrared sensors, ultrasonic sensors, electrochemical gas sensors, and semiconductor sensors. More recently, infrared imaging sensors have come into use. All of these sensors are used for a wide range of applications and can be found in industrial plants, refineries, pharmaceutical manufacturing, fumigation facilities, paper pulp mills, aircraft and shipbuilding facilities, hazmat operations, waste-water treatment facilities, vehicles, indoor air quality testing and homes.

D. *Flame Sensor*

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is properly lit; in these cases they take no direct action beyond notifying the operator or control system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame.

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IV. IMPLEMENTATION & METHODOLOGY

In this paper, Nodemcu ESP8266 Wi-Fi Development Board is used to transmit the data's. It provides capabilities for 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I²C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I²S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and pulse-width modulation (PWM). The ultrasonic sensor is used to find the level of junk filled at different intervals of time and placed at top of the bin, the Flame sensor is used to detect the flame level and gas sensor is used to detect the natural gas levels in the bin. NodeMCU Wi-Fi board is used as microcontroller platform.

Whenever the level reaches its threshold value, Wi-Fi modem is activated to send an alert to the government sway through the SMS. When the SMS alert is received, the sway informed to the workers for cleaning the filled bins on time without allowing them to overflow.

V. ADVANTAGES

1. Easy to detect the fill level, flame level & gas level in the moth bins.
2. Reduce the human resources and efforts.
3. Reduce the cost & complexity.
4. Easy to control & monitor the whole system.

VI. CONCLUSION

Implementation of real time junk automation monitoring by using moth bins to check whether the bins are full or not and to check the natural gas or flame are emitted from the moth bins. By implementing this system we will avoid over flowing of junk from the container in residential area which is either loaded by manually or with the help of loaders in trucks and the reduction of cost, human resources and efforts usage of the moth bins also be done and saves huge time. By reducing unnecessary rounds for junk collection, this system indirectly reduces traffic in the city. This system will inform the status of every moth bin in real time located throughout the city, so that the government sway can dispatch the junk collecting vehicles only when the bins are completely full or it reaches to full. In urban cities, depends on the population of the particular area, the junk collecting vehicles can visit there for everyday twice or thrice and sometimes these moth bins may or may not be full. It is user- friendly system.

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