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Advanced Garbage Bin Monitoring System for Hygienic Lifestyle

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Abstract - *The problem which mainly cause adverse effects to our environment is garbage. Due to spilling of garbage over dustbins and throwing of garbage anywhere cause various impact on our surroundings. Mostly in the greater part of urban areas we can see garbage bins flooded with garbage which cause the environment unhygienic. This can lead to various sorts of infectious diseases to emerge in the areas. Also, the insects and mosquitoes breed on this accumulated waste which can cause number of infectious diseases. The proposed system helps to control the overfilling of garbage bins thus can help to prevent the spread of any infectious diseases. The system make use of IOT technology which is one of the emerging technologies of the world. The proposed work includes smart dustbin which has many sensors including gas sensor which will help to detect the presence of toxic gases and thus alarm is generated which will notify the authorities about the presence of garbage and they will come and collect it. Also, there is Kinect sensor included in it which will help to detect human hand gestures through which the shutter of dustbin will open only for humans and the animals are not able to enter into the bin. Thus, it can prevent the garbage to spill anywhere and prevent the spread of infectious disease like COVID-19.*

Key Words*: *Gas sensor, Kinect sensor, IOT, COVID-19, Ultrasonic sensor, Humidity sensor, Node MCU

1. INTRODUCTION

Now a days due to large population and their heavy demands, industry area is more focusing on production which can generate more garbage. People using too much unnecessary equipment and no proper disposal method creates increase in garbage. People keep on feeding the garbage bin with garbage at the top level and also due to the existence of garbage in bin for long period the disease spreading can be done. Also due to the absence of shutter of a bin can provide a way to animals to interfere in garbage bin so they spread garbage on the road and they are getting infected if it contains harmful waste. So, to overcome such situation there should be a proper method to deal with garbage collection. Garbage collection is a tough job for the authorities dealing with it on daily base. To overcome this, we can have a solution with the use of technology. Here the solution is that we can have Garbage bin with sensors. It means whenever the garbage bin is full or it is out of capacity also when the harmful gases are generated then the alarm is generated and notification is sent to respective authority so that he will arrange someone to collect the garbage.

2. LITERATURE REVIEW:

[1] Prof. R. M. Sah, Akshay Godse, Pramod Shinde, Reshma Shinde published their paper International journal of innovative research on "Garbage and Street Light Monitoring System Using Internet of Things". In this paper the Siddhivinayak Technical Campus, School of Polytechnic & Research Technology, Shegaon organize bin set in public place and to capture the images of garbage bin, the camera is kept at location. For sending images to work station Radio Frequency Identification (RFID), GPS and GIS are used. The SMS technology is used to notify the respective authorities.

[2] Asha. R, Nirdosh Mahajan, Abhiraj Yadav, Balamurugan K.S published their paper International Journal of Recent Technology and Engineering on Garbage Managing Smart System using-IOT proposed a system which improved the performance of existing system by adding few more sensors which will help to collect more information about garbage like humidity. It also provides information about gases present in garbage and its level of toxicity. It also provides information about Wi-Fi used in system which uses less power and gives better communication facilities.

[3] B.Rajapandian , K.Madhanamohan , T.Tamilselvi, R.Prithiga published their paper International Journal of Engineering and Advanced Technology on Smart Dustbin proposed a system where one of sensor used ultrasonic signal to monitor the level of

garbage and if it exceeds beyond the level an warning signal is generated which is sent to the authorities. Another sensor senses the odor of garbage in dustbin. GSM and GPS are used for transmission of signals and to track locations.

[4] C R Margrat, Davis Navia, Martin Maneesha, George Livya published their paper International Journal of Advance Research and Development on com Smart Bin: A Swachh Bharat Approach proposed a system where the authorities get alert when the dustbin gets full. With the help of this system the government authorities get an SMS alert when the dustbin gets full.

3. EXISTING SYSTEM:

[2][3] The existing system uses one ultrasonic sensor to gather information regarding level of garbage in the bin. Due to real time monitoring of garbage level and wireless communication there is reduction in number of trips required by the garbage collection vehicle to collect the garbage.

3.1 PROPOSED SYSTEM:

The proposed system proposes a model which contains more sensors along with ultrasonic sensor. Here the Gas sensor is used to notify the harmful gases are generated in the garbage bin. Another sensor named Kinect sensor is used to open the shutter of a bin by detecting the human palm. This information helps to decrease the risk of expansion of any disease.

The SMS is been sent to the authorities when the level of garbage is high so that they will come and collect the garbage from the respective areas.

The SMS will be sent to the respective authorities in two situations. The first is when the garbage is exceeding the specified level of a bin and second is when the garbage is below the specified level but it contains harmful gases. For the transmission of a signal and tracking the location the GSM and GPS module is used. There is use of kinetic sensor which will help to detect only human palms for opening the shutter. This will help prevent animals from entering into dustbin and spreading the garbage anywhere

4. BLOCK DIAGRAM:

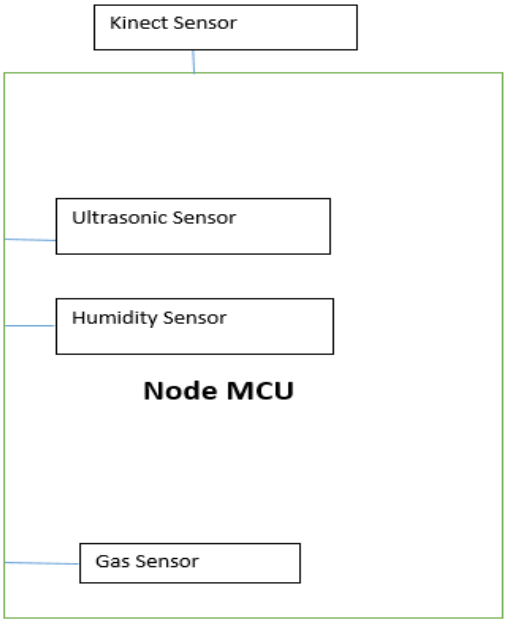

Figure -1

4.1 COMPONENTS AND SPECIFICATIONS

1. Node MCU:
[2] It is a low cost, open source firmware. The firmware uses the Lua scripting language. The data traffic between the sensor and firebase is managed by Node MCU.

2. Ultrasonic Sensors:
[4][2] It is a device that measure the distance up to the next obstacle with the help of sound waves. It has a transmitter and receiver in order to transmit and receive the sound pulse. This sensor is useful to detect the level of the garbage bin.

3. Humidity Sensor:
[2] This sensor detects the category of waste either dry or wet and based on the detection the waste can be segregated.

4. Gas Sensor:
After certain days the garbage is converted into the toxic waste which contains gases such as methane, hydrogen sulfide, carbon monoxide etc. In this situation the gas sensor is used to detect these harmful gases.

5. Motor driver:
[2] After the output of humidity sensor the wet and dry garbage is separated by Motor Driver

6. Arduino IDE:
It is used to code Node MCU and upload it on board. It is supported by Windows, Linux and MAC OS.

7. BLYNK App:
[2] It is a platform to control Arduino. It is freely available for iOS and Android. It allows communication with WI-FI compatible micro-controllers.

8. Jumper Wires:
These wires help to connect micro-controllers and sensors together.

5. WORKING:

In the proposed model the Node MCU is used instead of Arduino as the Node MCU is cheaper and It is based on ESP8266-12E WIFI system-on-chip, it is perfect in the situation where you are looking for more compact Wi-Fi equipped alternative. The other additional sensors also play an important role in this model. The role of Ultrasonic sensor used in this model is to detect the level of garbage. It is connected to Node MCU and the data can be transferred to the main office from where the garbage monitoring is done.

The Humidity sensor used in this model also plays an important role of categorizing the waste. It identifies the dry and wet waste and started the motor which helps to collect the waste in the appropriate container.

The level of toxicity also can be identified by Gas Sensor. If the garbage is more toxic than 10% then the alarm is generated to inform about the high toxicity level and based on this information the garbage can be collected early. This will help to reduce disease spreading in the society. The main moto to use this model is that it will helpful to maintain the hygiene of the environment.

The kinetic sensor is also used to detect the human palm for opening the shutter. This will help to prevent animals from entering into garbage bin so that they won't throw garbage anywhere. Also, the automatic opening and closing of shutter of the bin helps to prevent the spread of Covid-19 through waste generated at points such as public bins and quarantine zones.

The programming for the microcontroller can be done in such a way that If the garbage level reaches certain specified limit and the certain toxicity percentage criteria reached then the alarm is generated and the respective authority got a message so that he will send the garbage collection vehicle to the location to collect the garbage.

The microcontroller collects the data from the sensors and pass it on Wi-Fi chip. The Wi-Fi chip is responsible to send the information to the BLYNK app.

The GSM and GPS modules are used for transmission of signal and to track the location respectively. The SMS alert will be sent to authorities whenever the bin gets full. The SMS will contain the information of bin and its location.

6. CONCLUSION

The proposed system helps to keep the environment clean and hygienic. It helps people to live in hygienic conditions. The system helps to collect the dustbin waste on time. It also helps to trace the filled dustbins over cities. With the use of sensors and other devices it is possible to track level of garbage and also collect the information and send to the municipality officials. So that they will take appropriate action.

7. FUTURE SCOPE

-This project is helpful towards the government project "Swachh Bharat Abhiyan"
-This project will be helpful for managing a green environment.
-In future more advanced technologies can also be used in this system for better implementation of project.

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