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IOT based Voice Controlled Robot with Pollution Detection

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Abstract: ***Air pollution is a serious situation which ruins future generations.as of increasing population daily, lots of exploitation of resources takes place which in turn causes pollution. Mainly pollution due to vehicles & industries leads to much damage of health hazards and turned out to be one of the major problem world is facing now. Apart from oxygen, we breathe in fumes. outdoor air pollution has existed for a long time. Radon, volatile organic compounds, formaldehyde, biological contaminants, and combustion by-products such as carbon monoxide, carbon dioxide, sulfur dioxide, hydrocarbons, nitrogen dioxides, and particles contribute to indoor air pollution, sulfur dioxide, carbon monoxide, nitrogen oxides, ozone, total suspended particle matter, lead, carbon dioxide, and hazardous pollutants are the principal pollutants that contribute to outdoor air pollution.***
Air pollution causes severe diseases like asthma, cancer, breathing, skin irritation, and liver problems.
We see there's a lot of pollution around us makes it difficult for plants, animals, and humans to survive as the air becomes polluted. the pollution due to vehicles is one of the major aspects of pollution. this is because of in efficient fuel in vehicles and long term of vehicles (internal problem).
so we have come up with a solution by testing this application by making voice controlled robot with pollution detection at toll gates.
Keywords: Vehicular emissions, Human Safety, pollution-free air, pure air, pollution checking device.

I. INTRODUCTION

For many years pollution is one of the serious and trending issues which is not at all decreasing. air pollution occurs from various sources like industries, transportations like vehicles, coal mines, factories, powerplants, etc., this causes severe effects to human health with effects like asthma, headache, blood cancer, impacts on the liver system, shorted lifespan & breathing problems.
In India, this worst air pollution causes approximately 2 to 3 million a year.
From 2016 to 2019 various gases in different pollution sources like industries, vehicles are like CO, PM2.5, PM10, SO2, NO2, NH4, VOC'S like CH4, etc., In industries CO2 is released into the atmosphere by industries & sulfur gas releases by burning forms SO2, nitric forms H2SO4, HNO3. Also by burning fossil fuels in vehicles & power plants particulate matter (PM2.5, PM10) gas releases in to the environment. Ozone(O3) will be formed by mixing secondary pollutants with primary pollutants like NO2, SO2.
Ethanol blending in petrol also causes inefficient gas releases into the environment and also causes It can cause damage to the fuel pump if ethanol content in the fuel is very high (decrease in fuel lubricity, viscosity, and calorific value of the fuel, etc.) Cause damage to the environment because of the increasing ethanol blending with forming of ozone formation.
It refers to the release of pollutants into the air & which is determined by human health and the planet. increased emission from chlorofluorocarbons leads to depletion of the ozone layer. mixing denaturants into fuels is the major problem of pollution.
The pollution can only be decreased by avoiding the burning of waste materials like burning leaves, trash & other materials, replacing fossil fuels with solar, winds, etc.,
This air pollution causes severe damage to crops, animals, forests & bodies of water.
This air pollution can be reduced by starting from maintaining of efficient fuels and taking required measures to obtain the environment safe.
Air pollution is defined as the contamination of the atmosphere by gaseous, liquid, or solid wastes or by- products that can harm human health and the welfare of plants and animals, attack materials, reduce visibility (learn more about how Haze created by air pollution can impair visibility), or produce unpleasant problems. Although natural sources such as volcanoes, coniferous forests, and hot springs release certain pollutants, their impact is negligible when compared to pollution created by industrial sources, power and heat generation, waste disposal, and the operation of internal combustion engines. Fuel combustion is the leading source of man-made air pollution, with both fixed and mobile sources contributing equally. The problem of air pollution can be found both indoors and outside.

Engine type	Fuel Type	Vehicle type	Major emissions
Petrol Engine	Petrol	Cars, buses (also some lorries)	HC, CO, NO_x Pb and particulate.
Diesel Engine	Diesel	Lorries, trucks tractors (some buses & cars)	NO_x, SO_x, HC, CO, soot and particulates
Two-stroke Engine	Petrol	Motor cycles	HC, CO, NO_x, Pb and particulates

Fig.1. Effects on vehicles.

Source	CO (%)	Sul-phur Oxides (%)	Hydro-Carbons (%)	Parti-culates (%)	NO_x (%)	Overall Contribu-tion	Overall Propor-tion (%)
Transport	92	4	65	14	42	217	43.4
Industry	4	32	26	44	21	127	25.4
Electricity generation	O	48	0	21	32	101	20.2
Space heating	3	12	3	14	5	37	7.4
Refuse burning	1	4	6	7	0	18	3.6

Fig.2 Emission of gases

II. LITERATURE SURVEY

We have explored various sources which cause air pollution & the emission of gases and its effects in different applications & noted our users. because of this air pollution in various sectors like industries, vehicles it causes various effects to human health directly or indirectly lead to severe damage to us. We see there's a lot of pollution around us makes it difficult for plants, animals, and humans to survive as the air becomes polluted. the pollution due to vehicles is one of the major aspects of pollution. this is because of inefficient fuel in vehicles and long term of vehicles (internal problem).
We have quite a few solutions currently prevalent in

1) Gas detectors in industries which are of high cost and It doesn't alert the proprietors and nearby emergency services & detectors used in industries are not feasible.
2) No flexible low-cost devices to check the pollution.
3) No proper devices that can track the pollution level in cities and monitored it by people.
4) There are no systems that detect pollution, but they are only pollution checks.
5) Increasing in pollution (due to emission of gases from vehicles).
6) RTA POLLUTION CHECKS.
7) People carelessness towards the environment.
8) No one is checking the pollution and un-efficient fuel in vehicles and long term of vehicles (internal problem).
9) If this situation continues, it can cause an increased risk of heart attack, wheezing, coughing, and breathing problems, and irritation of the eyes, nose problems.
10) It is difficult for plants, animals and humans to survive as the air becomes polluted.

Toll plazas on highways are now operated manually, with a car approaching the toll booth, where the operator receives the money, enters the vehicle data, and issues a receipt. Because this may result in lengthier vehicle wait times at toll booths and heavy traffic on highways, causing unnecessary pollution along toll highways. Vehicle-related pollution continues to be a topic of concern around the world. The threat to the natural environment and human health is multi-faceted, and it's only going to get worse as the world's population grows.

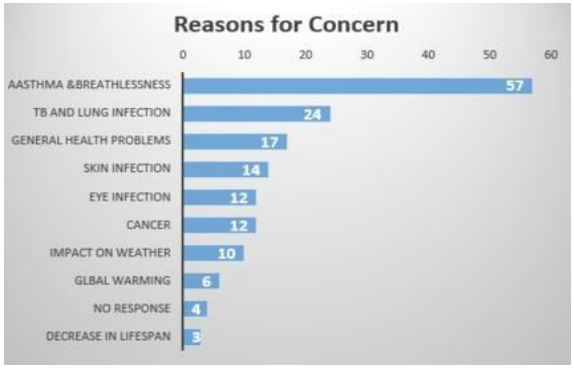

Fig.3 Effects on human

III. WORKING

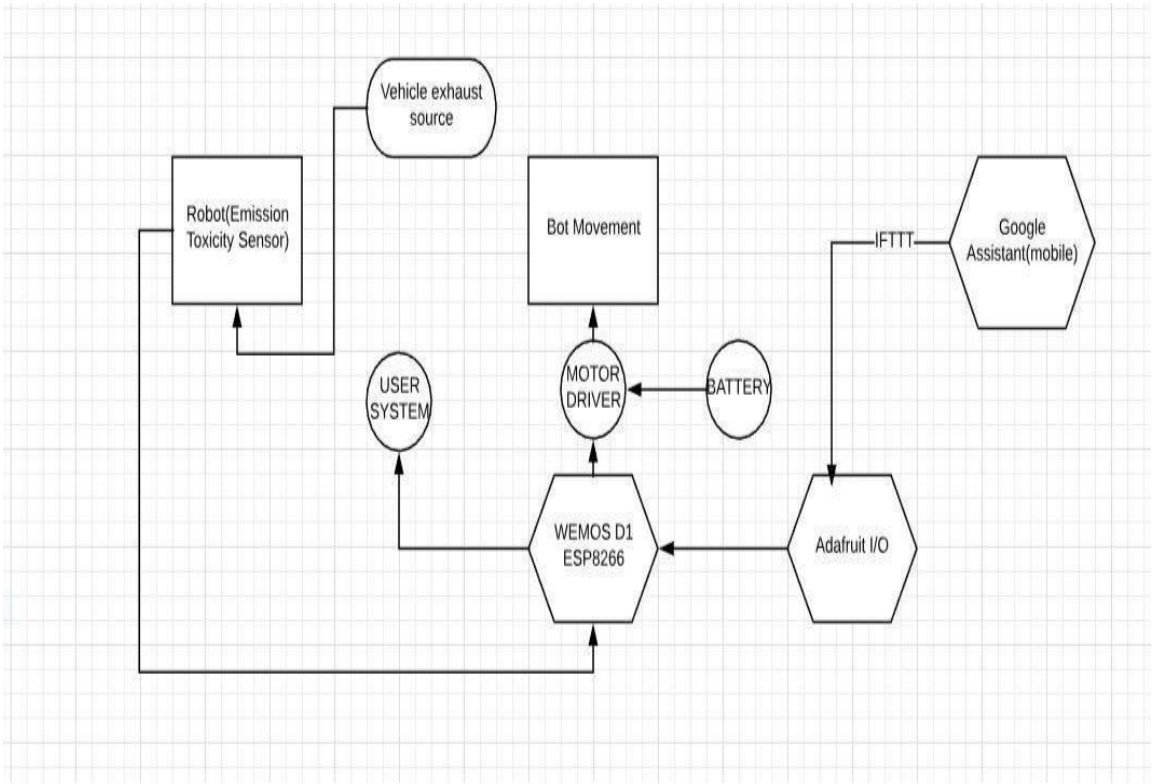

Fig.4 Block Diagram

This overall block diagram is divided into two parts:

As the vehicle approaches the toll booth, a probe is placed into the exhaust system, directing gases towards gas sensors, which quantify the amount of harmful chemicals present. With the support of the WEMOS D1 ESP8266 development board, these values are delivered to the user system.

For robot mobility, Google Assistant takes voice commands, which are translated into orders by Adafruit-IO via IFTTT, which then sends commands to a microcontroller, which controls motor drivers and allows the robot to move.

Here we have used MQ3 which is an ethanol, benzene, and alcohol detecting sensor, MQ9 is exclusively used for detecting CO(carbon monoxide) , MQ135 is used for air quality(Total volatile organic compounds) detection such as CO, NOX gases.

So whenever there is a greater than the threshold level it scans the number of the vehicle using OCR (optical camera recognition module) and sends it to RTA and challan will be issued on the vehicle.

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IV. CIRCUIT DESIGN

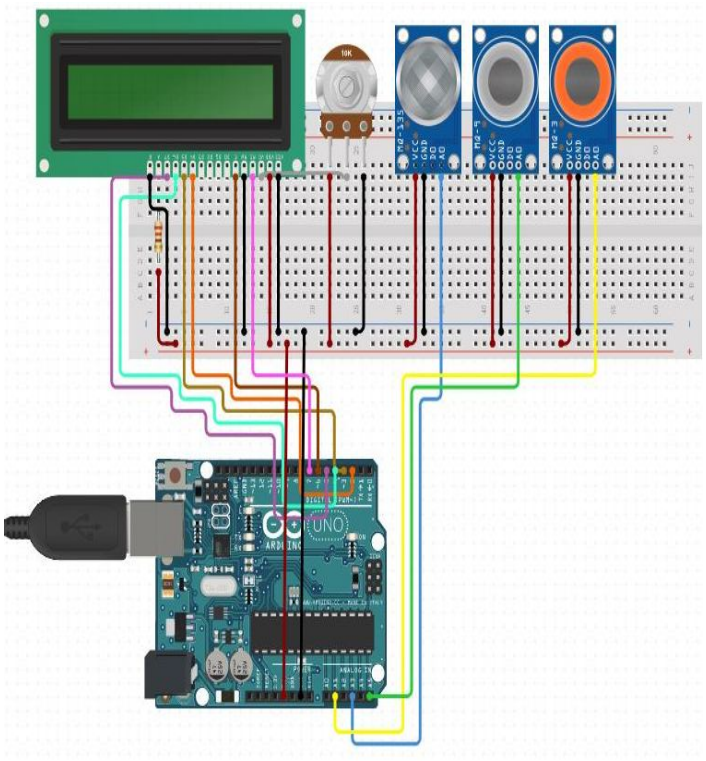


Fig.5 Circuit Design.

A. The power terminal 5V terminal of Arduino UNO is connected to all the three gas sensors +5v pin.
B. The ground terminal of gas sensors is connected to the common ground terminal of Arduino UNO.
C. The LCD is also given a 5Vpower supply.
D. The intensity of the LCD can be controlled using the potentiometer on the back.
E. 5V power supply is given to the Arduino UNO from the external battery with the help of a battery snapper.
F. LED is connected with the help of a resistor of value 330 ohms.
G. Push buttons are used to take the values of latitude, longitude values of the points with the help of Gas sensors.

This idea can be extended by interfacing it with the wi-fi module and can alert the people using cloud /blynk app.
Whenever the gas sensors detected value is greater than the threshold level, it displays it in the LCD as gas detected.

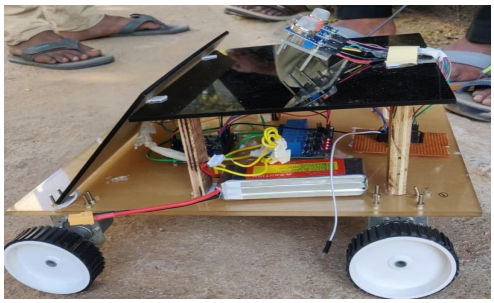
V. ALGORITHM

The following are the main steps in the robot process with detection:

A. The WEMOS D1 ESP8266 microcontroller is initially connected to the local network This is a cell phone.
B. Access to Adafruit IO is gained by using voice commands on our phone. The needed command is run, data is delivered over Adafruit IO, and the bot is pushed forward and backward.
C. We employ relays over there to offer quick switching.60
D. Data from sensors is delivered through a multiplexer, which sends four lines of data
E. Over a single line. We can execute the appropriate commands by providing the
F. Required logic.
G. The information is then presented on the screen.

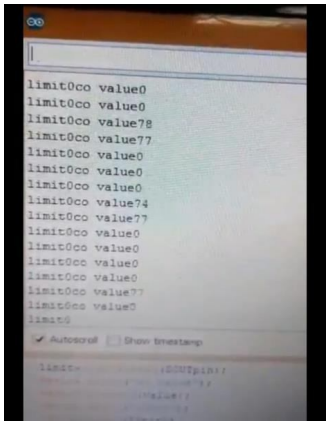
VI. RESULTS

The robots move in forward, backward, clockwise and anticlockwise direction using voice commands.



Commanding in IFTTT application by interfacing Google Voice assistant to Adafruit IO cloud.

Gas sensor detected values in the feed of Adafruit IO cloud & LCD display



VII. APPLICATIONS

This project is very helpful in the situations where pollution problem existed in various applications in the sectors given below.

A. At toll gates where the pollution detects within less time.
B. Industries (at various locations in the industry where pollution level can be monitored).
C. Metropolitan cities where the pollution level is high (at high traffic signal crossings and checkpoints at petrol bunks).
D. Coalmines, factories, laboratories, communities, chemical industries, etc.,

VIII. FUTURE SCOPE

We want to improvise and make the following features in our idea.

A. If the pollution content released from vehicles is very high (i.e., greater than the threshold voltage)then the vehicle number sends to RTA through the cloud, and CHALLAN(fine) Issued on the vehicle.
B. Planning to improvise the robot by adding OCR CAMERA and it detects the vehicle number.
C. We want to make an autonomous robot/at toll gates that detect pollution within less time.
D. This is a voice-controlled robot with gas detection but in future,we are planning to do a gas detection system with pollution level monitoring and giving alerts in various applications.
E. Voice-controlled robots can also be used in various applications.

IX. CONCLUSION

We may infer that we have successfully built a robot that will be useful in reducing the amount of pollutants released. to avoid dangerous circumstances, the pollution detecting system performs admirably. More idea nurturing in the future will undoubtedly have a significant impact on pollution management in a variety of applications. When the car arrives at the toll gate, the pollution level can be checked. (We won't be able to cover all automobiles, but we will be able to cover as many as possible.)
Without an environment that makes positive choices easy, natural, and joyful, you won't be able to make them for the rest of your life.

X. ACKNOWLEDGEMENT

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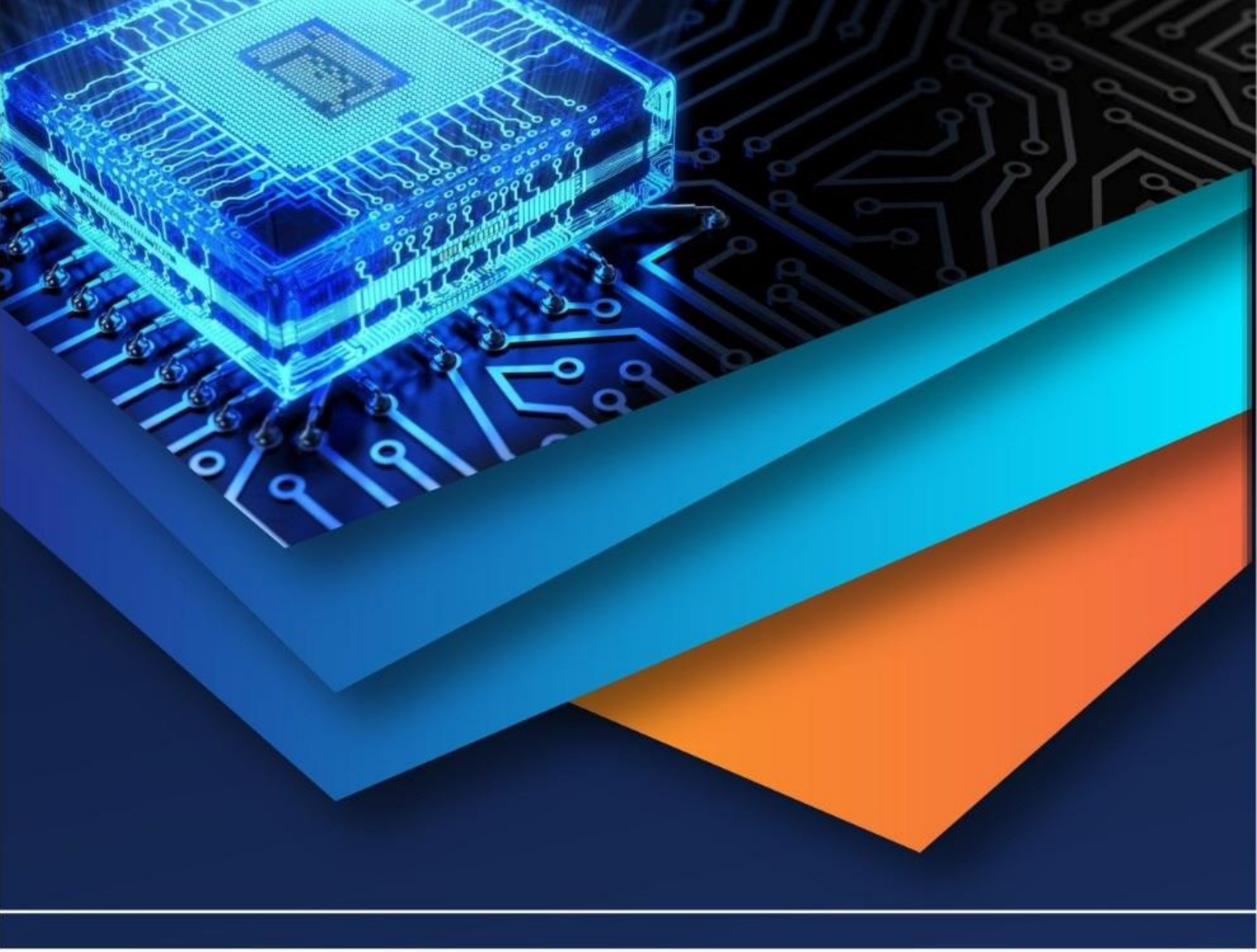

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