Smart Stowaway Detection using MQ-135 Sensor

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***Abstract*:- Someone who covertly boards a vehicle, such as a ship, an aeroplane, or freight without authorization is known as a stowaway or clandestine traveller. Stowaways are one of the major challenges to detect as they find innovative ways to travel. The concern is to develop an automatic system to detect the stowaways travelling. The development is proposed to be based upon the Arduino Uno microcontroller board, an MQ135 CO2 sensor module, an active buzzer module, and a display for the results. This project will mainly focus on details of the results of the activities conducted to determine the effectiveness of the CO2 monitoring technology for detecting stowaways and its qualification efforts. This embedded system uses the MQ-135 sensor for monitoring the CO2. The sensor reads the C02 in parts per million (ppm) unit, then displays the CO2 readings. The data collected by the sensors is sent to information processing centre called cloud server (AWS) through wireless medium using an emerging technology Internet of Things (IoT), telegram application is used for remotely accessing the sensor from any region and controlling it. The system also consists of an active buzzer which is set on whenever the reading of the device is more than the set threshold value which confirms the presence of a person inside the cargo or any suspected space which will enable the security staffs to take quick and decisive action.**

Keywords:- Arduino UNO, MQ-135 sensor, Buzzer, Carbon Dioxide, Internet Of Things.

INTRODUCTION:

Stowaways are the persons travelling from one place to another without having any legal permissions from the respective legal authorities or any legal documents of the countries in which they are travelling. They try to avoid getting detected by using various means like hiding in vehicles container, train surfing and various other means of transportation. The stowaways mostly use the land and waterways to travel in comparison to airways.

LITERATURE SURVEY:

[1]. IoT Based Air Pollution Monitoring Device: Nidhi Gaur, et al. 2020 raise the concern about the Air pollution and develop ed a system to detect toxic gasses in environment, here he uses different kind of sensors which is exposed in nature. Raspberry pi 3 and Arduino UNO panels has been used to assimilate the sensors which has been used. This model used cloud computing technology. The sensors have been accommodated to corresponding panels which will transact the strike the distinct properties and access the final result.

[2]. Electronic Nose with Detection Method: Miller, et al. 2021 observed symptoms like coronavirus Which will be caused by respiratory weakness Which was very severe, so he has been come up with one the solution that is electronic nose which will catch the clustering of human breath simulation, which has been used to detect alcohol content, or any of the gases.

[3]. IoT mobile air-examination: Swati, et al. 2019 she used the most emerging technology i.e., IoT And used Arduino uno, IoT kit. also advanced one application named IoTMobAir which has been used to find air quality. If any of the person moving from one place to another, he or she may check the pollution level from beginning to the target point. If there is high giant pollution than the cautioning has been displayed.

[4]. Less expenditure including IoT LoRaWAN network: Sharafat, et al. 2020 has advanced less cost sensor. This has been used for scaling distant gases present in environment, which also measures the particulate matter level. It has the capacity for tremendous or small range intercommunication over WAN. Less expenditure sensor appears to be good at corelation including information clustered from sensors.

[5] Monitoring Environmental Quality: Siavash, et al. 2020 has been shapeup the connectivity to address the ZIGBEE system. the zigbeeb has been connected with industries parameters. The data has been collected on the various gas. (CO2, NO2, SO2). Has been developed air moving as a power model and pollution traceability has been done to cover or monitor whole city pollution. At the end it has been proven that major source of pollution is due to industries.

[6] Arduino CO2 Monitoring Device: Lapshina, et al. 2019 has developed CO2 monitoring device using Arduino Uno. He focusses on the fact that it has been seen that major threat for human life is due to its Air quality. CO2 is major problem for human health. So due to this high level of issue. They developed CO2 monitoring device. It has been controlled or compiled in IDE software shell. The device which has been advanced will exhibit the data from sensors on LCD screen.

[7] Indoor Air Quality examination network: Esfahani, et al. 2020 is focusing on the indoor air quality as is also play vital role in human health. To improve airquality in indoor we must know or examine some of the things which causes the air pollution. They have been developed less expenditure, convenient IoT indoor airquality examining network, which also has a best battery life i.e., 30 hours. Can also be used on daily basis by using low power modes. This technology can also be used in large scale cities for smart city.

[8] Air Scope: Mobile Robots- Assisted Indoor Air Quality Sensing: Zhiwen, et al. 2020 observed that the air pollution in indoor has been increasing the health risk, but it has become very difficult to implement people with air examination devices which has low cost for indoor

environment so he used “Airscope”. Which is a mobile analysing system which consists of robots for monitoring quality of air. The accumulation of robots usually in smaller space raises their mean data latency of the other ignored space.

[9] Orchestrating Secure and Dynamic Access of IoT Services: Kazim, et al. 2018 has used IoT devices and cloud computing. The IoT backend and cloud computing present fresh approaches to providing services that are greatly scalable, firmly configurable, and distributed on demand with substantial architecture resources. The use of a single cloud computing system does not always satisfy all of our needs, so he suggested using multiple clouds in conjunction with IoT. This can help users better meet their needs by letting them select the best IoT services from a variety of services hosted on different cloud platforms and by giving them access to more architecture and platform resources. The suggested protocols have actually been put into practise on OpenStack and Amazon AWS, two separate clouds.

[10] Attribute- Based Access Control for AWS IoT: Smriti, et al. 2021 says that The Internet of Things (IoT) has revolutionised and improved human life in every way. One essential security measure for the Internet of Things (IoT) ecosystem, which includes cloud and edge computing services as well as smart devices, is access control. In the modern world, the major cloud and IoT service providers, such as Amazon Web Services (AWS), Google Cloud Platform (GCP), and Azure, use specialised versions of the Role Based Access Control (RBAC) paradigm in conjunction with certain authorization regulations.

In the above-mentioned literature survey, we can observe that the system which they have used is costly, the technologies which they are having is not convenient for use, electronic nose lacks sensitivity in the presence of water vapor or high concentration of alcohol, Electrochemical sensors are Narrow or has limited temperature range. In contrast to all the papers our project is more convenient and telegram app which we used is free, faster, user friendly, easily we can control from any location, used as cloud storage for future purpose, does not require high maintenance, graphical representation can be done so that user can easily recognize and analyze. The system is more upgraded and user friendly with considerable output

PROPOSED ARCHITECTURE:

ARDUINO UNO:

The ATmega328P chipset and a microcontroller form the basis of the Arduino Uno board. There are 14 digital input/output pins total, with 6 being used for analogue inputs and 6 being used for outputs. a reset button, an ICSP header, a power jack, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), and a USB port. It comes with everything a microcontroller requires; the only thing left to do is to connect it to a battery or an AC-to-DC adaptor.

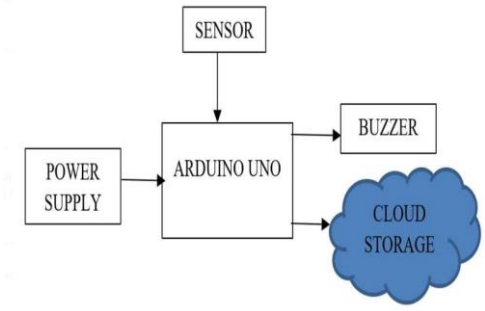
MQ-135 SENSOR:

The MQ135 is from the MQ series of sensors which is popular for its gas sense that is used in air quality control equipment. It can operate on both digital and analog output from 2.5V to 5.0V.

BUZZER

A buzzer or a beeper is an audio device that converts audio signals to sound signals, which can be used for wide range of applications such as alarm, siren, timer etc.

METHODOLOGY



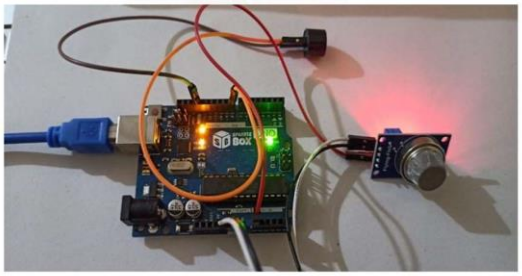


Fig. Final system

In this project we are using sensor MQ-135 which is used to monitor CO2, and it is connected to Arduino UNO, sensor will sense CO2 from sensor, and a threshold value is set in ppm, when the level of CO2 reach threshold points then the buzzer will ring and alert security that any stowaway is there. This device is made to control by telegram app and can be controlled from anywhere. The data is recorded and send to Cloud Storage which is Amazon Web Service (AWS).

RESULT AND ANALYSIS

We have developed a stowaway detection system. The purpose of our system is to detect a person illegally traveling across the country. Our project will mainly focus on CO2 (carbon dioxide) monitoring technology for detecting

stowaway. After all the setup or connection of - Arduino uno buzzer, sensor. Our system will detect the CO2 level of human breathing by MQ-135 sensor. We have set the range of 100 PPM. If it goes higher than the threshold range then it will inform the security.

Time	CH1	CH2
11:34:45	79	

Historical Data

Time	CH1	CH2
11:34:20	82	
11:34:21	89	
11:34:21	96	
11:34:22	101	
11:34:22	108	
11:34:23	113	
11:34:23	117	
11:34:24	122	
11:34:24	127	

Fig. Data collection

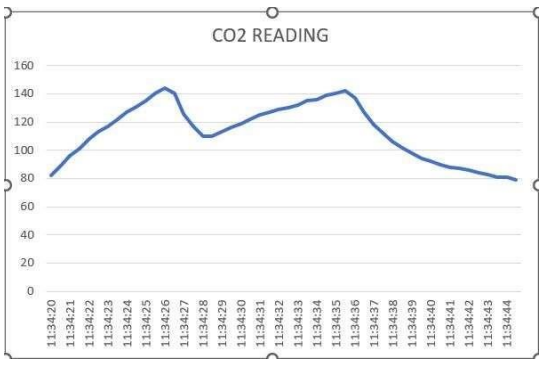


Fig Graph formed of co2 with time

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