

VOC Detection in Waste Bin: A step towards Environmental Sustainability

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Abstract: Work has been carried out on waste management system world wide. However, there is a need of robust and intelligent system in this field. The prevailing traditional system is neither optimized nor well organized. Diseases which come from waste are causing health problems to the public health and environment which is the major problem nowadays. To overcome these issues, modern technological tools may help to control the environmental sustainability. Internet of Things (IoT) has been playing a supportive role in human life by making systems advance, portable, well-educated, smart and self-sufficient. Thus, this paper proposes an efficient smart waste management system to detect the volatile organic compound (VOC) in waste bins as a step toward environmental sustainability that is the main concept of this paper. A real-time sensor that is embedded with waste bins to determine the level of VOC, temperature, humidity and finally the capacity of remaining waste. The system will allow completing this procedure in every five minutes of the cycle. Our proposed system will verify the report before its delivery to municipal authority by proper authentication process. Thus, this latest system tries to reduce the present issues at least at the maximum level and making the system more optimized.

Keywords: BME680 Sensor; Environmental Sustainability; Indoor Air Quality Index; Internet of Things; VOC

1. Introduction

Environmental Sustainability

Nowadays the major headache is healthcare challenges are consistently rising up according to the condition of the environment. In the current 21st Century, there is a vast need of healthcare policymakers and providers to take action on the impact of growing global warming and environmental healthcare services. The current pandemic Coronavirus disease (COVID-19) is not a separate one; it is directly linked to the climate crisis. In recent years we observe changes in the environment and its huge impact on human health on a large scale without any response from healthcare policymakers and providers. The first target which is necessary to achieve is to overcome the climate crisis. Climate change mainly affects human health, animal health and environmental conditions. To maintain environmental sustainability, we should eliminate pollution and waste material, which are directly affecting the environmental sustainability? [1]

Our neighboring country, India is thinking to take a decision under the Smart City Mission (SCM). Where their perception is to use the opportunity to make structures for environmental sustainability smart cities (ECCS). Developed countries have already worked on sustainable cities and currently they are working on smart sustainable cities and it is a big challenge for underdeveloping countries by using the advanced tool of "information and communication technology" (ICT). Smart city environmental sustainability index (SCESI) framework along a scale having (0-100) range is developed. Environmental sustainability has been classified under five categories (Excellent, Good, Fair, Poor and critically low) these categories will be indicating the condition of the environment. The basic target of this achievement is to check the condition of the environment on spot by using advanced technology, information and communication technology (ICT) and Smart city environmental sustainability index (SCESI) framework along an indicator having specific value through which the present condition will be identified. [2]

Volatile Organic Compound

Volatile Organic Compound (VOC) creates lots of complications in human life which is difficult to control. Some of them are kidney issues, lungs, ecosystem and growth of plants etc. Volatile Organic Compound (VOC) has a low molecular mass but high vapor pressure even it will have vaporized at room temperature. Keeping in view, the current situation advanced technology is required to detect the level of volatile organic compound.

(VOC) at any stage indoor and outdoor environment. Till now analytical standard technology such as chromatography and spectroscopy were used to detect the Volatile Organic Compound_ (VOC) but there was some issue in these technology. The main issue identify in this technology was sensitivity and accuracy but these two must be necessary for every sensor detector. In view of this shortcoming a new technology is introduced having outstanding reliable features. The "Nanomaterials" technology are introduced in the production of sensor for to improve the performance. And this sensor gave outstanding performance to detect level of volatile organic compound_ (VOC). [3]

The indoor air pollution such as air fresheners, dryer sheet, cleaning product, carpet, kitchen store, paints and furniture keep effective effect on our health and environment more than our perception. Existence of indoor Volatile Organic Compound_ (VOC) are normally more effective than outdoor. Indoor Volatile Organic Compound_ (VOC). As we know that the air pollution which belongs to the open environment having weak will power as compare to indoor environment because number of disease are vulnerable by sunlight so, Indoor air pollution create maximum health problem and number of people effect through indoor air pollution through a whole year according to estimation shown in Figure 1 . To overcome these problems, we introduced a sensor array detector which monitors the harmful Volatile Organic Compound_ (VOC), by taking small test on house shield product to examine its accuracy. We have designed specific laboratory with respect to indoor environment to perform the test. Our designed system is capable to detect the Volatile Organic Compound_ (VOC) and its source. PCA is also include for identification and classification of result. [4]

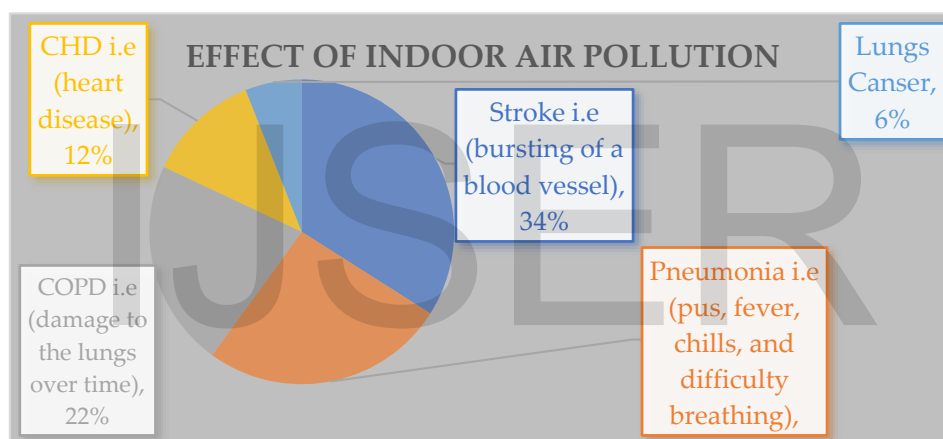


Figure 1: Effect of indoor air pollution on environment and human health

Effect of Volatile Organic Compound_ (VOC) on Environmental Sustainability

Whenever, we study the Volatile Organic Compound_ (VOC), then only thought that comes to our mind is that it has hazardous effect on environmental and human health. According to an estimation Volatile Organic Compound_ (VOC) harms thousands of people throughout the year. But it does not happen always because of its dual behaviors. It also shows beneficial effects on our environment to maintain its stability. I observed from the studies on chemistry and source of forest Volatile Organic Compound_ (VOC) that it has pleasant effect on our mind and body on inhaling. Thus, it improves brain functioning by decreasing mental fatigue providing relaxation, and enhancing perception and behavior. Resultantly forest Volatile Organic Compound_ (VOC) provides beneficial impact on psychological and physiological health. [5]

The global warming is observed to be challenging issue in this era. It is increasing day by day due to some factors intensity of heat on earth arte caused by some hazardous gases which emits from house such as Volatile Organic Compound_ (VOC), nitrogen gas_ (NO) and carbon dioxide_ (CO) generally seemed since 20th century to till now. Scientist are constantly working on valid phenomena which get rid from environmental atmospheric effect through it so, it's clear that volatile organic compound _ (VOC) effects millions of people each year. It effects the kidney, lungs, irritation on eye and skin problem etc. Beside that emission of Volatile Organic Compound_ (VOC and nitroxide cause acid rain and formation of smoke shown in Figure 2. [6]

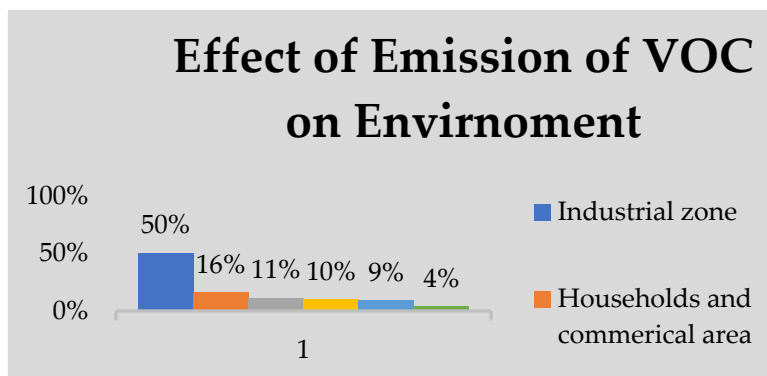


Figure 2: Emission of VOC cause multiple complication in environment

To overcome these problems a lot of research has been done and some research are near to be complicated for getting solution. Thousands of endogenous and exogenous Volatile Organic Compound_ (VOC) excite into body and the other side metabolic process which is already exist into the body effected to the endogenous level in that stage scientist easy to examine the disease [7].

How Internet of thing_ (IOT) enable with Volatile Organic Compound_ (VOC) to maintain the environmental sustainability

Every Organic Chemicals that exist in this universe have high vapor pressure even rapidly vaporized at room temperature. Volatile Organic Compound_ (VOC) is one of these numerous compound. Volatile Organic Compound_ (VOC) exist everywhere even indoor and outdoor environment. According to accurate estimation Volatile Organic Compound_ (VOC) have hazardous impact on our environment and human being health which weaken the stability of environment. In this advanced age, Internet of thing- (IOT) based smart and sufficient sensor may exist. Which help us to detect the presence of Volatile Organic Compound_ (VOC) in air. Basically presence of sensor shows how we maintained the sustainability of environment. For detection of Volatile Organic Compound_ (VOC), we used VOCKit which may provide guidance's to non-expert chemist for easy to understanding and also identify the types of Volatile Organic Compound_ (VOC). The gained from experiment with 97% accuracy which is biggest success in 2019 [8].

Some latest chemical sensor is used to measure the level of Volatile Organic Compound_ (VOC) indoor environment as well as outdoor environment, the chemical sensor includes IR and Pellister sensor and these sensors will provide enhance response time, sensitivity, measurement range and resolution measurement [9].

Latest nanotechnology has improved the issue of stability, precision and enhanced the performance for better result of detection in Volatile Organic Compound_ (VOC). In this since, internet of thing_ (IOT) is playing an important role, both for human being and environmental sustainability [10].

How internet of thing_ (IOT) control and maintain the Volatile Organic Compound_ (VOC) in waste bin for environmental sustainability

Domestic waste classification is effective procedure to improve the resource recycling in developed and under-developed cities. But most educated countries are far away from the importance of the classified collection due to less awareness. To solve this problem municipal solid waste was introduced and it has benefit for environmental sustainability. Therefore, specific area was selected to examine the result. The main purpose of this experiment was to identify the level of Volatile Organic Compound_ (VOC) in waste bin. In summer Volatile Organic Compound_ (VOC) reach at extreme level $1.02 \times 10^3 \mu\text{g}/\text{m}^3$. The municipal solid waste_ (MSE) is helpful procedure to decrease the level of Volatile organic compound_ (VOC) level. [11]

The biggest problem we have seen in 21st century is waste management system. Many diseases are arising due to lack of system and problem in waste management system. Which extensively effect the public health and environment. As far as we know, old technology does not overcome these situations because few work has been done on it. This because of our laziness and use of old technology while we did not pay attention to it despite the fact that advance technology like Internet of thing_ (IOT). Internet of thing_ (IOT) has been playing supportive role by making system advanced, authentic and smart. The main point of focus is how to detect the level of Volatile Organic Compound_ (VOC) in waste bin. For step toward environmental sustainability. A real time sensor is connected with system which is used to detect level of Volatile Organic Compound_ (VOC) and temperature which come from VOC in waste bin. [12].

2. Literature Reviews

In recent years IOT has involve in many activities. It provides help to create many successful community-based systems and applications which are making our life easier and stable for living.

Ibrahim et.al the paper states that global warming not only affects human health but also pollutes the environment and has adverse effects on animals. Which causes many diseases every year [1]. The pandemic Corona-virus disease (COVID19) is one of these diseases which has recently appeared due to the global warming (climate crisis) and spread in every corner of the word [13]. Therefore, to maintain global warning to make sustainable the environment by using the following practices show in figure 3 [101]. Throughout the most recent 25 years there has been negligible effort to control the emission of greenhouse gases [14]. We can control on production of carbon dioxide by reducing the emission of greenhouse gases [15] [16]. Less use of plastic in social activity [17] Try to eat less to reduce the wastage of food [18]. The main point this paper which must be focus is, High-resource countries are produced more pollutes as compare to low-resource countries. Because of this, other countries that are not included in it but they are affected by it [16].



Figure 3: Environmental sustainability should be maintaining by following practices

Developed countries have already worked on sustainable cities and current they are working on smart sustainable cities but it is a big challenge for under developing countries [19]. Our neighbor country, India is thinking to take a decision under smart city mission (SMC) [20]. The study of this paper is to identify the existing environmental conditions of cities. Therefore, by using the following technologies to check environmental condition of cities and we will discuss it one by one [2]. Information and communication technology _ICT is used to addressing urban challenges and problems in simply way [21, 22]. Smart city environmental sustainability (SCESI) which it is also called small index through which we can identify the condition of environmental sustainability [21, 22]. (SCESI) _index scale having range value is (0-100) and that is categorically classified in range wised through which any value that is find we can easily insert it to find its category. Four domain index (DI)

is used to calculate the value of DI on particular selective cities [2]. And value shows what effect has on environmental sustainability [21, 22]. The general expression for the Smart City Environmental Sustainability Index (SCESI) is given by [2]

$$SCESI = \left(\sum_{i=1}^m v_i DI_i \right) / m$$

Volatile Organic Compound_ (VOC) creates lots of complications in human life which is difficult to control [23]. Some of them are caused Kidney issue, Lugs, Ecosystem and growth of plants etc. [24, 25]. It has low molecular mass but high vapor pressure even it will vaporize at room temperature [26, 27]. There are 300 volatile Organic Compound_ (VOC) are exists in this universe indoor and outdoor environment but indoor_ (VOC) are more hazardous than outdoor_ (VOC) [26, 28, 29]. Therefore, Volatile Organic Compound_ (VOC) can be controlled by using the following technologies and we will discuss one by one [3]. Some technology such as chromatography and spectroscopy were used to detect but there was sensitivity and accuracy issue. Hybrid nanomaterial based sensor is used to detect the (VOC) [3]. Basically it is based on two marge sensor, Optical sensor that helps to convert light ray into electronic signal [30, 31] and electrochemical sensor that help to give information during composition of system in real time [32, 33].

Indoor air pollution creates maximum health problem show in figure 4 [102]. And number of people effect through indoor air pollution through a whole year [34]. The indoor air pollution such as air fresheners, dryer sheet, cleaning product, carpet, kitchen store, paints and furniture keep effective effect on our health and environment [35, 36, 37]. According to estimation there are 1.5 to 2 million deaths worldwide caused by indoor air pollution [38]. Therefore, Indoor volatile organic compound can be controlled by using the following technologies and we will discuss one by one [4]. Sensor array is used to detect the VOC and its response time for collecting data is 8min [4]. Principal component analysis (PCA) is used to identify and classification of indoor_ (VOC) [4]. Test chamber is used to detection of Indoor air pollution [4]. And ultra clean air is used to remove extra pressure [4].

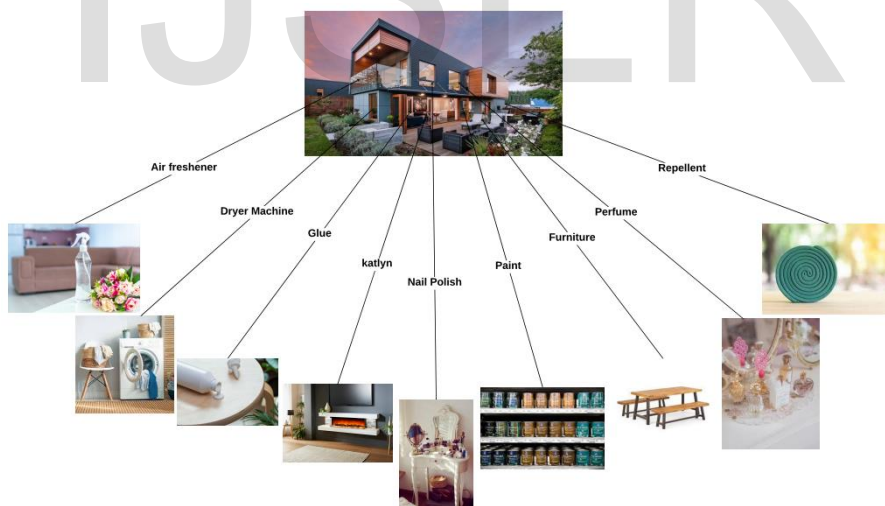


Figure 4: Presence of indoor volatile organic compound

Whenever, we study the Volatile Organic Compound_ (VOC), and then only first thought that comes to our mind is that VOC has hazardous effect on environmental and human health [23]. Which case much disease such as, lung cancer, kidney issue and irritation in eye etc. [24, 25]. But it does not happen always because every chemical has dual effect sometime its affectivity is better for improvement of its life and sometime danger for it [5]. Forest Volatile Organic Compound_ (VOC) is one of those that it has pleasant effect on our mind and body [39, 40]. Therefore, to maintain the forest volatile organic compound by using the following technologies and we will discuss one by one [5]. Through large amount of plant growing, we can easily maintain forest volatile organic compound [5]. Most common effect of forest VOCs are anti-inflammatory, anti-oxidant, anti-proliferative, anti- nociception, anti-depressant, seductive, analgesic, muscle relaxant, gastro protective, metabolism and

anti-hyperlipidemia these forest VOC s effect is used to reduce effectiveness of disease [41, 42, 43, 44, 45, 46]. Which are beneficial for improvement in brain functioning by decreasing mental fatigue providing relaxation, and enhancing perception and behavior [47, 48].

Air and water pollution are playing a very important role in affecting the environmental condition [49]. Because of this a small part of the disease arises and affects a very large portion such acid rain and lung cancer, according to estimation air pollution is responsible for 3.6 million deaths per year [50, 51]. These all hazardous disease comes from emission of VOC and effect the living thing shown in Figure 5 [103]. Therefore, emission of volatile organic compound can be controlled by using the following technologies and we will discuss it [6]. Catalytic oxidation method is used eliminate level of emission of the VOC [52]. Basically catalytic oxidation to be an effective and efficient way for removal of volatile organic compound because due to its feature higher destructive efficiency and lower operating temperate [53]. It can completely mineralize VOC to CO₂ and H₂O instead it will transfer into toxic chemical [54, 55]. The general expression for the elimination of volatile organic compound is given by [6] VOCs+ catalytic oxidation= CO₂+H₂O.

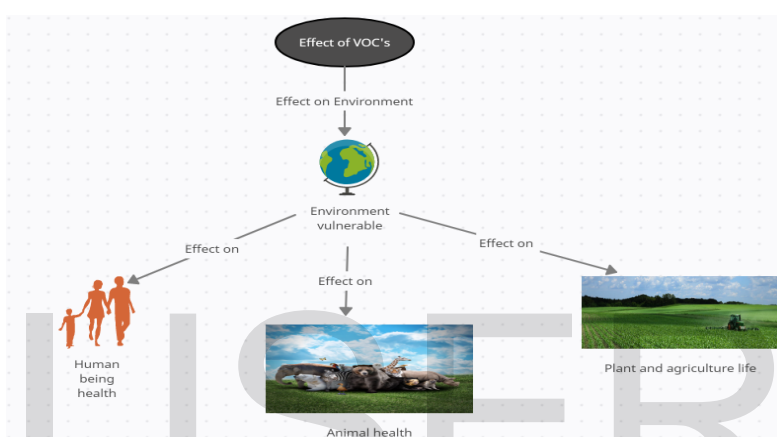


Figure 5: Effect of volatile organci compound on envirnmental living thing

Per day humans exhale millions of molecules as they exhale breathe [56, 57]. Thousands of endogenous and exogenous volatile organic compound_ (VOC) excite into body [58, 59]. This issue creates lot of problem in human being and cause for responsible of different disease like asthma [60, 61, 62, 63]. Therefore, following technologies is used to monitoring and detecting the volatile organic compound so, we will discuss one by one [7]. Cohort description is method in which adjust the common data. Breath analysis is used to identify the condition of patient for to monitoring the presence of volatile organic compound. And data analysis is used to analyze the data [7].

Every Organic Chemicals have high vapor pressure even rapidly vaporized at room temperature. Volatile Organic Compound_ (VOC) is one of these numerous compounds which keep hazardous effect and cause weak the environmental sustainability [26, 27, 64]. Presence of VOC is indoor and outdoor in both environments but more affectivity is indoor environment [26, 28, 29]. Therefore, by using the following technologies to detect the presence of volatile organic compound in environment and we will discuss them one by one [8]. VOCKit sensor is used for detection of VOC show in Figure 6 [6]. It will help to non-expert's person for easily to understand [65, 66]. Two-machine learning algorithm random forest and K_mean algorithm is used for specifying the result [67].

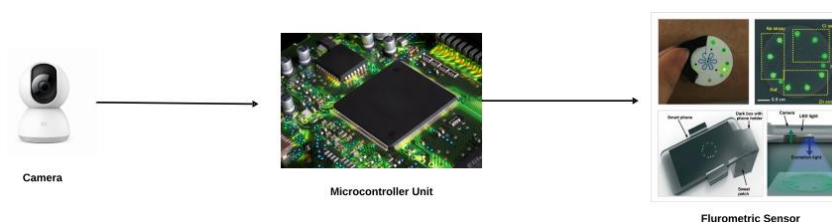


Figure 6: VOckit for detecting the presence of VOC in environment

Every Organic Chemicals have high vapor pressure even rapidly vaporized at room temperature. Volatile Organic Compound_ (VOC) is one of these numerous compounds, which keep hazardous effect and cause weak the environmental sustainability. Presence of VOC is indoor and outdoor in both environments but more affectivity is indoor environment and cause different diseases such as lung cancer, asthma etc. [26, 27, 28, 29, 64, 68, 69, 70]. Therefore, the chemical sensor which is merging with different sensor is used to identification of volatile organic compound for improvement of environmental sustainability and we will discuss it [9]. Metal oxide semi-conductor sensor is used to monitor air pressure, Photoionization sensor detector is used for monitoring the emission, Non dispersive infrared sensor is used to check indoor air quality, Electrochemical sensor is used for protection of environment and Pellistor sensor is used to identifying the risk of explosion [71, 72, 73].

Thousands of people become victim of different disease throughout the year [74]. VOCs is chemical compound which present in indoor environment as well as outdoor environment but affectivity of indoor VOCs is generally high as compare to other [26, 28, 29, 75]. Therefore, detection of Volatile organic compound is performed by using the following technologies and we will discuss one by one [10]. Nanotechnology was introduced to the solve problem and it has high stability, precision and enhanced the performance of detection for keep environmental sustainability [76]. It is alliance with three different sensors; Chemical resistance sensor is used to change chemical resistance when near able chemical environment change [77]. Optical sensor is used to convert light ray into electronic signal [78]. And electrochemical sensor is used to given information of system in real time [77, 79].

Classification of Domestic waste is effective procedure to improve the resource recycling in developed and underdeveloped cities [80]. Due to less awareness and knowledge most educated countries are far away from the importance of the classified collection [81, 82]. Therefore, effective Domestic waste can be controlled by using the following technologies and we will discuss one by one [11]. Municipal solid waste was introduced to the solve problem and it has benefit for environmental sustainability [83]. Basically it is based on four different methods but work together, sampling site method is used to collect the method from waste bin at particular time [84, 85]. Analysis method is used to reduce the error by partible gas chromatography mass spectrometry system [86]. Ozone formation potential analysis (OFPA) method is used to define the chemical reactivity of volatile organic compound [87, 88, 89]. And human health risk assessment is used to calculate risk analysis of carcinogens and non-carcinogens [90, 91, 85].

Many diseases are arising due to lack of system and problem in waste management system. That creates effective effect on environment sustainability and public health. Therefore, the problem of waste collection can be stabilized by using the following technologies and we will discuss one by one [12]. Internet of thing_ (IOT) has been playing supportive role by making system advanced, authentic and smart [92, 93, 94]. Which make efficient and easily understandable system [95]. IOT based waste collection system is introduced to solve this problem [96]. Basically it is based on four different methods but working along, BME680 sensor is used to measure the level of VOC, temperature and humidity of waste bin [12]. IR sensor and ultrasonic sensor (HC-SR04) is used to check the status of waste bin and it will send the message when dustbin filled e.g. 80%, 90% and 100% [96, 97, 98]. ESP 8266 module is used to collect the data from waste bin and send it to could network [98]. Google map platform API's is used to identify the specific route for destination [99]. And for exchanging of data to each other Routing Protocol for Low Power and Lossy Networks (RPL) _protocol is used [100].

No#	Paper	Objective	Techniques	Sensor	Equation	Result	country
Environmental Sustainability							
1	Ossebaard et al.(2021)	To examine the impact on environmental sustainability, health_care, ecosystem and climate change by changing of global warming	(i)Less use of plastic. (ii)Reduce the Production of Carbon dioxide (CO2). (iii)Reduce the use of water and energy (iv)Try to eat less to reduce the wastage of food.	-	-	Form last 25 years there has been minimal global progress enhance due to reducing the emission of Greenhouse gases	The Netherlands and Ireland
2	Shruti et al.(2021)	To determines the environmental condition of the city by using smart city environmental sustainability index (SCESI) scale	(i)SCESI scale Index (ii)Domain index (DI) is used to calculate the value of DI on particular selective cities	-	$SCESI = \left(\sum_{i=1}^m v_i DI_i \right) / m$	Five different city selected to examined, while three cities (Delhi, Allahabad, and Bhubaneswar) are in Fair category Reaming two cities (Patna and Varanasi) are found in the Poor category	India
Volatile organic compound_(VOC)							
3	Andre et.al(2018)	To determine the existence of volatile organic compound _(VOC) indoor and outdoor for controlling the creation of environmental health problems.	(i)Electrochemical method (ii)Optical sensor method	(i)Hybrid nano-materials-based sensors.	-	Remarkable progress have been seen from last five year in the performance of sensors to detect the VOC	Brazil

4	Chen et.al(2018)	To determine the presence of volatile organic compound_(VOC) from household product	(i)Principal component analysis (ii)Test chamber (iii)Ultraclean air (iv)Confusion matrix (v)Likelihood matrix (vi)Similarity index table	(i)Sensor array	-	The high concentration of VOC is find in Paint stripper (PS)= 99.96 And secondly find in Paint stripper and paint (PS+P)= 98.01	USA
Effect of volatile organic compound_(VOC)on environmental sustainability							
5	Antonelli, et al.(2020)	To maintain the improvement in brain functioning by decreasing mental fatigue providing relaxation, enhancing perception and behavior through keeping the presence of forest volatile organic compound_ (VOC)	(i)limonene (ii)pinene	-	-	High accuracy of Forest VOC is to be seeded	Italy
6	Bensouilah, et al.(2020)	To control on emission of volatile organic compound_ (VOC) for decreasing the rate level of diseases to maintain environmental sustainability	(i)catalytic oxidation	-	VOCs+ catalytic oxidation = CO ₂ +H ₂ O	Accurate result generate	Tunisia
7	Blanchet, et al.(2017)	To determine the level of VOC by monitoring sen-	(i)Gas Chromatography-time-off light (ii)Mass Spectrometry (iii)Breath analysis	-	-	Age, gender and BMI significantly affect breath profiles, but their	The Netherland and USA

		sor and get the valid solution to resolve the problem	(iv)Cohort description (v)Data analysis			effect are more subtle than smoking behaviors	
How Internet of thing_ (IOT) enable with Volatile organic compound_ (VOC) to maintain environmental sustainability							
8	Ahn, et al.(2021)	Detecting and classifying the presence of various Volatile Organic Compounds (VOCs) in the air.	(i)Random forest algorithm (ii)K_ means algorithm	(i)VOCkit sensors (ii)fluorometric sensors	-	Our results show a classification accuracy of 97%	Seoul, Korea
9	Szulczyński, et al.(2017)	To determine the measurement of volatile organic compounds (VOCs) in outdoor and indoor air	(i)Gas chromatographs, UV (ii)IR spectrometers	(i)Metal oxide semi-conductor sensor (ii)Photoionization sensor detector (iii)Non dispersive infrared sensor (iv)Electrochemical sensor (v)Pellistor sensor	-	Detection and measurement of VOCs is improved.	Poland
10	Jalal, et al.(2018)	To examine the detection of volatile organic compound in personal health management in real-time.	(i)Nanotechnology	(i)Chemi_ resistor sensor (ii)Optical sensor (iii)Electrochemical sensor	-	85% accuracy	USA

Volatile organic compound_ (VOC) generate in waste bin and how internet of thing_ (IOT) control and maintain the environmental sustainability from VOC							
11	Shi, et al.(2020)	To improve the resource recycling in developed and underdeveloped cities for decreasing the volatile organic compound	(i)Sampling site method (ii)Analysis method (iii)Ozone formation potential analysis methods (iv)Human health risk assessment method	-	-	Before: The OFP of VOCs reached the highest peak in summer, which was $1.02 \times 10^3 \mu\text{g}/\text{m}^3$ After: classification, the concentration and OFP of VOCs were reduced but when we check CR in spring and summer, posing probable risks especially in the spring.	china
12	Haque, et al.(2020)	By using IOT based efficient waste collection system with smart bins. To monitor the waste bins and determines which bins are to emptied in every cycle of waste collection. The system also presents an enhanced navigation system that shows the best route to collect wastes from the selected bins.	(i) Smart bin system (ii) Real-time monitoring system (ESP 8266 module) (iii) Navigation system (Google map platform API's)	(i)BME680 sensor (ii)IR sensor (iii)ultrasonic sensor (HC-SR04)	-	The significantly of system is decreases the travel distance as compared to the traditional system and it makes the waste collection process more efficient and also reduces the cost.	Dhaka, Bangladesh and USA

3. Discussion

There is a lot of work has been carried out on waste management system in world-wide. But the prevailing traditional system is neither optimized nor well-organized, due to incompetence, VOC generate from the waste and cause different disease which effect to the public health and environment shown in Figure 7 [104].

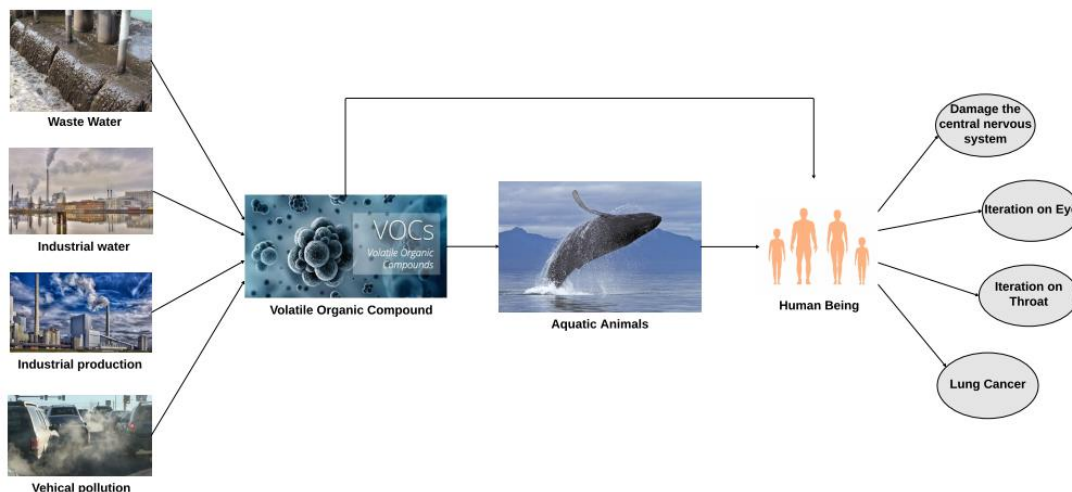


Figure 7: Effect of VOC on environment

However, there is a need of robust and intelligent system in this field. Which is the major necessity nowadays. To overcome this issue, modern technology may help to detect the volatile organic compound. Many VOC detecting systems have been purposed show in Figure 8 [105].

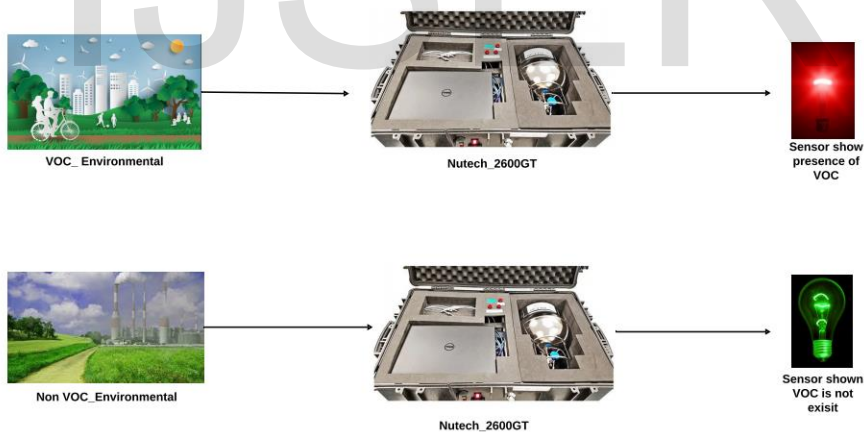


Figure 8: To detecting the presence of VOC in environment

We have discussed the detecting of VOC till now. But our target is to monitor the presence of VOC in waste bin therefore Some already IOT_ efficient based waste management is purposed to detect the presence of volatile organic compound in waste bin. The efficient based waste management system model is not for only specific area it will hold large society show in Figure 9 [106].

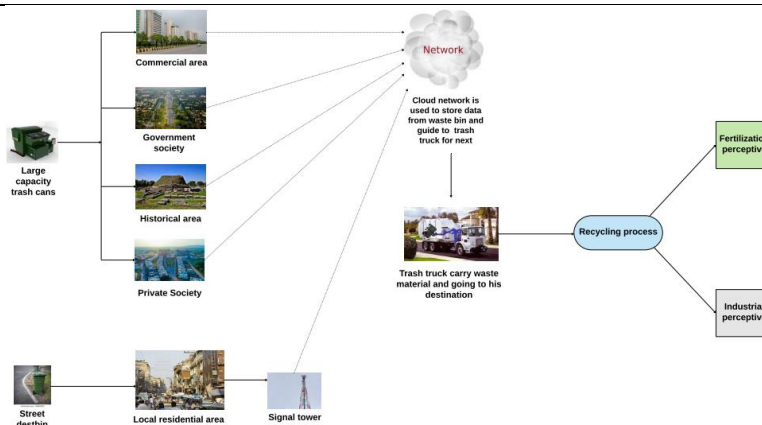


Figure 9: detecting the presence of VOC in waste bin

4. Future work

The disease which come from the waste is vastly and directly effect to the public health and environment which is the major problem nowadays. As we know that lack of optimized and well organized Waste Management systems_ (SWM) are not overcome these current situations. The prevailing traditional system is neither optimized nor well-organized. Internet of thing_ (IOT) has been playing supportive role in human life by making system smart, advanced, well educated, suitable, exportable and self-sufficient. Thus, this paper proposes Volatile organic compound Detection in waste bin a step toward environmental sustainability. That is the main concept of this paper.

A real time sensor monitoring to the waste bins which determined the value of volatile organic compound_(VOC) in the waste bin and it will also check the temperature and humidity of the bins which generate through the Volatile organic compound and this process will done by in every thirty minutes of the cycle before deliver the system will make sure the report of the condition by proper authentication process and it will also inform the remaining capacity of the bin for the waste to the municipal authority thus this latest system will try to reduce the present issues at least at maximum level and making system well-organized and more portable show in Figure 10.

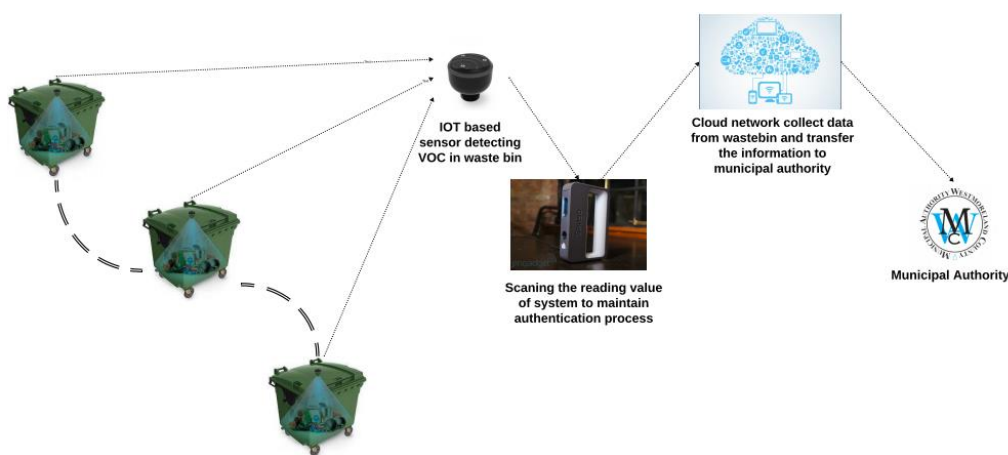


Figure 9: Detecting VOC in waste bin through IOT based sensor

5. Conclusion:

It is concluded that Volatile organic compound_ VOC cause many diseases by effecting environmental sustainability. In this review paper we have reviewed many study about VOC. We have finally come to this conclusion after comparing twelve separate paper that by using different sensing technologies different result are obtained. A list of result discovered by researcher’s have been tabulated to detect the VOC by using several IOT based sensors. It is illustrated that many sensors have good performance of detecting and accuracy for obtaining result, BME680, Hybrid nanomaterials-based sensor, Sensor array and VOckit sensor. But the censorious point that must be focus in this review paper is that

our system performance and accuracy will be increased in this case when we are working on our main purpose not to be interlinked the another module.

6. Reference

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