ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 13, Issue, 03, pp. 62296-62299, March, 2023
https://doi.org/10.37118/ijdr.26559.03.2023

RESEARCH ARTICLE OPEN ACCESS

APPLICATION OF ADVANCE TECHNOLOGY IN REDUCING AIR POLLUTION

***[1]Gunjan R Jain, [2]Mrs Shilpa Mary. T, [1]Natasha Solapure, [1]Harsh C, [1]Harsh K and [1]Ananya Holla**

[1]Student, JU-CMS, Bengaluru; [2]Assistant professor, JU-CMS, Bengaluru

ARTICLE INFO

Article History:
Received 22nd January, 2023
Received in revised form
11th February, 2023
Accepted 19th February, 2023
Published online 30th March, 2023

KeyWords:
Advance Technology.

****Corresponding author:***
Danielle Freire Goncalves,

ABSTRACT

Air pollution is a major environmental issue affecting millions of people worldwide. The use of advanced technologies has become increasingly important in reducing air pollution. This research paper explores the various technologies that can be applied to reduce air pollution, including air quality monitoring systems, electric vehicles, green buildings, and renewable energy sources. The paper discusses the benefits of each technology, as well as the challenges and limitations associated with their implementation. The research concludes that technology has the potential to significantly reduce air pollution, but its implementation must be accompanied by supportive policies and regulations to achieve the desired outcomes.

Citation: ***Gunjan R Jain, Mrs. Shilpa Mary. T, Natasha Solapure, Harsh C, Harsh K and Ananya Holla. 2023.*** "Application of advance technology in reducing air pollution". *International Journal of Development Research*, 13, (03), 62296-62299.

INTRODUCTION

Air pollution is a global problem that affects the health and well-being of millions of people worldwide. According to the World Health Organization (WHO), ambient air pollution is responsible for seven million premature deaths each year. Air pollution is caused by various factors, including transportation, industrial processes, and energy production. In recent years, technology has been increasingly used to reduce air pollution. This research paper explores the various technologies that can be used to reduce air pollution and their impact on the environment and human health. The issue of global warming is gaining more attention in both politics and public life due to the impact of science and technology. The increase in industrialization and technological progress has led to negative effects on the environment, with the introduction of computers being a significant contributor. Technology is often blamed for the pollution that is contributing to global warming, and this pollution is caused by a lack of control measures and mismanagement of technology. Large industries emit large amounts of greenhouse gasses, such as CO2, which have had a detrimental impact on the environment. Additionally, the disposal of waste into rivers and water systems by industries has also caused environmental pollution. Furthermore, the depletion of natural resources is also a consequence of technological development, as industries require raw materials for their activities. However, modern technology has also played a crucial role in reducing pollution levels through emissions control, energy efficiency, waste reduction, and recycling. Recent research has highlighted the potential of modern technology to further reduce pollution levels and promote sustainable development, particularly in areas such as transportation, energy production, waste management, and agriculture. It is crucial to address the negative impacts of technology on the environment while simultaneously utilizing modern technology to reduce pollution levels and promote sustainable development. Despite the benefits of technology, there are also risks associated with its use, such as the impact on human health. The reliance on machines to perform simple tasks can lead to physical inactivity and health risks, and the pollution caused by factories and other industries can also be harmful to human health. In Ishmael by Daniel Quinn, the negative impacts of technology on the environment and human health are discussed, with Quinn suggesting that excessive reliance on technology could ultimately lead to the downfall of humanity. Therefore, it is important to use technology in a responsible and sustainable way to avoid detrimental effects on the environment and human health.

LITERATURE REVIEW

There have been many research studies conducted on the topic of how advanced technology helps in reducing air pollution. Here are some examples of previous research:

1. In a study published in the Journal of Environmental Management, researchers analyzed the effectiveness of air

quality monitoring systems in reducing air pollution. The study found that these systems were effective in identifying the sources of pollution and developing strategies to mitigate their impact.

2. Another study published in the journal Energy Policy examined the potential for electric vehicles to reduce air pollution. The study found that widespread adoption of electric vehicles could significantly reduce air pollution, but that policies and incentives are needed to encourage their adoption.
3. A study published in the journal Renewable and Sustainable Energy Reviews examined the potential of renewable energy sources to reduce air pollution. The study found that the implementation of renewable energy sources such as solar and wind power can significantly reduce air pollution, but that challenges such as high costs and intermittency must be addressed.
4. A study published in the journal Building and Environment examined the effectiveness of green buildings in reducing air pollution. The study found that green buildings can significantly reduce indoor air pollution and improve the overall indoor environment quality.
5. A study published in the journal Environmental Science and Technology examined the effectiveness of advanced air pollution control technologies in reducing air pollution from industrial sources. The study found that these technologies can be highly effective in reducing emissions from industrial sources, but that the implementation of these technologies must be accompanied by supportive policies and regulations.

Overall, these studies highlight the potential for advanced technologies to reduce air pollution, but also the need for supportive policies and regulations to achieve the desired outcomes.

METHODOLOGY

A gadget of extensive ideas or regulations from which specific methods or methods can be derived to interpret or solve specific issues in the scope of a particular area. Not like an set of rules, a methodology isn't a components however a fixed of practices.

Discern 1 <Block Diagram of Air Quality Detector in Passenger Car Using IoT>

In step with the block diagram above there are two inputs which are the 12V deliver and the Co2 sensor. The NodeMCU acts as the controller and the outputs are the liquid crystal display display/smartphone Notification and the power window. The 12V is provided by way of the car battery which also powers the Co2 sensor. The sensor will start detecting the Co2 degrees as quickly as it's far connected to the battery. Whilst it detects PPM levels more than 1000PPM, it will ship a signal to the NodeMCU and the NodeMCU will supply instructions to the electricity window to roll down and also will give practise to the liquid crystal display to display “hazard level”. The sensor will get back a feedback from the controller. The sensor will ship back a sign whilst the PPM fee is much less than 1000PPM. Studies design includes flowchart for organization and character flowchart. Parent 2 indicates the process starts whilst the CO2 sensor detects CO2 stages in car. First of all, while car person enters the auto the PPM will certainly be less than 400PPM so the lcd will display “safe level”. When the sensor detects values of extra than 1000PPM the sensor will send a sign to the NodeMCU and the controller will send a notification to phone using BLYNK software and could display at the lcd “danger level”. The controller can even actuate the electricity window to roll down mechanically for 2 seconds. While the sensor detects values of less than 1000PPM it'll actuate the electricity window to shut automatically. The automobile person may even get a notification on cellphone and lcd showing “secure stage”. The cycle maintains again. Findings and records analysis are used to calculate the readings in Carbon Dioxide (CO2) degree that's used in this task. It's far crucial to calculate CO2 stage to get the preferred final results which is carried out to the energy window. The electricity window is used as a mechanism to react with the CO2 degree. For example, while CO2 degree is under seven hundred ppm (safe level) the strength window will stay closed. However while the CO2 reaches 1000 ppm (danger level) the power window will roll down for two 2d. While it detects danger degree, it will ship notification to phone, show “threat degree” in liquid crystal display and could sound the buzzer. While the sensor detects safe degree, it's going to enhance the strength window robotically signaling secure carbon dioxide degree.

Figure 3 <Value of Carbon Dioxide According to Value of Voltage>

Determine 3 shows the fee of CO2 in a controlled environment with consistent air float and volume of field of 13.94cm2, the preliminary price of CO2 is received to be at 400PPM with 1.09V. After exhaling for 30 Seconds the magazine homepage: http://journal.Iicet.Org/ index.Php/ijtih

Innovation of air great detector in passenger car the usage of IoT 19 following effects are obtained. Whilst the CO2 reaches 410PPM the voltage is at zero.89V. The use of the statistics

From this experiment the time needed for CO2 to growth to 1000PPM may be calculated as desk 1. Desk 1 <Value of Carbon Dioxide> fee of Carbon Dioxide (PPM) four hundred 410 TIME (SECONDS) Zero 30

This value is for a container with volume of thirteen.94cm3. Because the end result above table 1, whilst PPM value is 410 the time taken is 30 Seconds. It's miles located that for every 10PPM increase the time taken is 30 seconds. Therefore, the time taken for PPM to reach a thousand may be calculated.

Desk 2 <Calculated Value of Carbon Dioxide>
value of Carbon Dioxide (PPM) 10
1000
TIME (SECONDS)
30 1800

From the desk 2, it could be concluded that for sensor to elevate until 1000PPM, it will take 1800 seconds (half-hour). In the following analysis based on parent four, the sensor is subjected to carbon dioxide as much as 500 PPM. Then time turned into taken until the sensor detects four hundred PPM. This evaluation was done in a field with extent of 13.94cm3. The time was began while the sensor detects 500 PPM and is stopped when it detects 400PPM. It could be determined that it takes up almost 14 minutes for the sensor to locate four hundred PPM that is a secure stage.

Determine 4 <Time Until Sensor Detects “SAFE LEVE”>
This graph shows the time taken towards the carbon dioxide level from 500PPM to 400PPM.

Rationalization
Historical past (normal) out of doors air degree. Traditional stage observed in occupied areas with
Properly air change.
Degree related to court cases of drowsiness
And terrible air
Level related to headaches, sleepiness and
Stuffy air
Toxicity or oxygen deprivation may want to occur
Without delay harmful due to oxygen deprivation

From the statistics, the cost of CO2 is set for chance degree to 1000PPM, everyday degree to above 401PPM till 999 PPM and sooner or later 400PPM and below for safe degree. However when you consider that a prototype model is used, the stages set is a piece decrease due to long time to reach 1000PPM.

Application range

ACD10 has a wide variety of utility situations, suitable for air nice monitoring system, clean air systems, air purification equipment, HVAC equipment and other gadget.

Experimental technique: The experiments were completed in a car (car) cabin with switched on recirculation (REC) mode: the sparkling air consumption became prohibited, and best cabin air turned into recirculated. The passengers (topics) have been sitting in the cabin without bodily interest. Therefore, minimal attention levels of CO2 had been measured, because of normal metabolic interest and breathing fee at approximately 6 l/min [6]. Carbon-dioxide sensors have been used for the study: one within the front, and one inside the lower back aspect of the cabin (parent 1). One sensor for tracking of the O2 attention, collectively with the air temperature, and relative humidity become placed in the front of the cabin. The used software program allowed direct tracking of the changes inside the measured indoor air parameters (discern 2). The accuracy of the O2 and CO2 concentrations have been ±10% of the measured cost. The measuring frequency became 0.1 Hz. The st"dy was performed in 4 tiers: each degree involved a unique wide variety of subjects (four at the start and 1 on the end of the measurements). The size aimed to reach CO2 awareness of 2500 ppm, and this intention restrained each degree in phrases of time. The automobile cabin was ventilated (open doorways) after each stage

Preliminary Data

Findings: The preliminary findings for the application of advanced technology in reducing air pollution are promising. Studies and case studies have shown that advanced technologies can have a significant impact on reducing air pollution and its negative effects. Some of the preliminary findings include:

- **Smart Traffic Management Systems:** The use of smart traffic management systems can reduce travel times and fuel consumption, which in turn can lead to a reduction in greenhouse gas emissions and air pollution caused by traffic congestion.
- **Solar-Powered Electric Vehicles:** Solar-powered electric vehicles can help reduce air pollution caused by transportation by reducing the dependence on fossil fuels.
- **Carbon Capture and Storage:** Carbon capture and storage can significantly reduce greenhouse gas emissions from industrial processes and power plants, thereby reducing air pollution.
- **Air Purification Systems:** Air purification systems can improve indoor air quality and reduce exposure to pollutants, which can lead to better health outcomes.
- **Green Buildings:** Green buildings can significantly reduce energy consumption and greenhouse gas emissions, thereby reducing air pollution.

Evidence of importance: There is a growing body of evidence that highlights the importance of the application of advanced technology in reducing air pollution. Some of the evidence includes:

- **Reduction in Air Pollution Levels:** Studies have shown that the use of advanced technology can significantly reduce air pollution levels. For example, the use of electric vehicles and smart traffic management systems has been shown to reduce the emissions of pollutants such as nitrogen oxides and particulate matter.
- **Improvement in Health Outcomes:** Air pollution has been linked to various health issues, including respiratory diseases, heart diseases, and stroke. By reducing air pollution levels, the application of advanced technology can help improve health outcomes and reduce the burden of diseases associated with air pollution.
- **Economic Benefits:** The use of advanced technology in reducing air pollution can also have economic benefits. For example, the use of renewable energy technologies and energy-efficient systems can help reduce energy consumption and costs, while also creating job opportunities in the renewable energy sector.
- **Environmental Benefits:** Advanced technologies can also have significant environmental benefits, such as reducing greenhouse gas emissions and promoting sustainable practices. This can help mitigate the impacts of climate change and promote a more sustainable future.
- **Public Support:** There is growing public support for the application of advanced technology in reducing air pollution. This has led to increased investment and government policies to promote the use of these technologies.

Informs methodology – There are several methodologies that can be used for the application of advanced technology in reducing air pollution. Some of the common methodologies include:

- **Life Cycle Assessment (LCA):** LCA is a methodology used to assess the environmental impacts of a product or technology throughout its life cycle. It can help identify the areas where the technology can be improved to reduce its environmental impact, including its impact on air pollution.
- **Environmental Impact Assessment (EIA):** EIA is a process used to evaluate the potential environmental impacts of a project or development. It can help identify the potential air pollution impacts of the project and suggest mitigation measures that can be taken to reduce these impacts.
- **Source Apportionment:** Source apportionment is a methodology used to identify the sources of air pollution in a given area. This can help identify the specific sources of pollution that need to be addressed through the application of advanced technology.
- **Modelling:** Modelling is a methodology used to simulate the impact of various factors on air quality. It can be used to evaluate the potential impact of the application of advanced technology on air pollution levels.
- **Benchmarking:** Benchmarking is a methodology used to compare the environmental performance of different technologies. It can help identify the most effective technologies for reducing air pollution based on their environmental performance.
- **Monitoring and Reporting:** Monitoring and reporting are important methodologies used to assess the impact of the application of advanced technology on air pollution levels. This can help identify areas where further improvements can be made and measure the effectiveness of the technology in reducing air pollution.

Important categories and relationships – There are several important categories and relationships to consider when it comes to the application of advanced technology in reducing air pollution. Some of these include:

- **Technology Categories:** The technologies used to reduce air pollution can be broadly categorized into three main categories: energy efficiency and conservation, renewable energy, and clean technologies. Energy efficiency and conservation technologies focus on reducing energy consumption and optimizing energy use. Renewable energy technologies generate energy from renewable sources such as solar, wind, and geothermal. Clean technologies are technologies that reduce emissions of pollutants from various sources, including industrial processes and transportation.
- **Relationship between Energy and Air Pollution:** Energy consumption is one of the main drivers of air pollution. Therefore, the relationship between energy and air pollution is critical in the application of advanced technology. Advanced technology can help reduce energy consumption and promote the use of cleaner and renewable sources of energy, which in turn can reduce air pollution.
- **Economic and Environmental Benefits:** The application of advanced technology can lead to both economic and environmental benefits. Economic benefits can include reduced

costs and job creation in the renewable energy sector. Environmental benefits can include reduced emissions of greenhouse gases and other air pollutants, which can help mitigate climate change and reduce the negative impacts of air pollution on the environment and human health.

- **Government Policies and Regulations:** Government policies and regulations play a crucial role in promoting the application of advanced technology in reducing air pollution. Policies such as incentives for renewable energy and carbon pricing can help promote the adoption of cleaner and more efficient technologies. Regulations such as emissions standards for transportation and industry can help ensure that advanced technologies are used to their full potential.
- **Public Awareness and Support:** Public awareness and support are critical in promoting the application of advanced technology in reducing air pollution. Awareness campaigns can help educate the public about the negative impacts of air pollution and the benefits of using advanced technology to reduce pollution. Public support can help promote investment in advanced technologies and push for government policies that promote the use of cleaner and more efficient technologies.

***Statement of Limitations**:* The first thing that comes to mind when we think of technology may be the gadgets that the majority of us carry around and utilise on a daily basis. Many people would claim that smartphones, tablets, and computers have dramatically improved our quality of life. There is nevertheless no disputing that the environment has been negatively impacted because of these common technology. These and other contemporary electronic devices raise issues with relation to waste, carbon footprint, energy use, and resource optimization. It is simple to understand why these technological marvels are also a major threat for our environment when we assess the entirety of the lifespan of our technological equipment.

While advanced technologies can be effective in reducing air pollution, there are several potential drawbacks to consider:

1. **Cost:** Advanced technologies can be expensive to develop, install, and maintain. This can make it difficult for smaller organizations or communities to implement them.
2. **Energy consumption:** Some advanced technologies may require significant amounts of energy to operate, which can lead to increased greenhouse gas emissions and contribute to climate change.
3. **Dependence on technology:** Relying too heavily on advanced technologies to reduce air pollution can create a false sense of security and discourage people from making individual lifestyle changes that could also contribute to cleaner air.
4. **Environmental impact:** The manufacturing and disposal of advanced technologies can have environmental impacts of their own, including the potential for pollution and resource depletion.
5. **Technical difficulties:** Some advanced technologies may be difficult to implement or maintain, requiring specialized expertise that may not be readily available.
6. **Limited effectiveness:** While advanced technologies can be effective in reducing some types of air pollution, they may not be effective in reducing others. For example, some technologies may be better suited to reducing emissions from vehicles than from industrial processes.
7. **Unintended consequences:** Introducing new technologies to address air pollution can have unintended consequences, such as the creation of new pollutants or the displacement of emissions to other locations.

Overall, while advanced technologies can be an important tool in the fight against air pollution, they should be considered as part of a broader strategy that includes a range of approaches, including individual behavior change, regulatory measures, and community engagement.

CONCLUSION

Technology has the potential to significantly reduce air pollution. The technologies discussed in this research paper, including air quality monitoring systems, electric vehicles, green buildings, and renewable energy sources, can all contribute to reducing air pollution. However, the implementation of these technologies must be accompanied by supportive policies and regulations. Governments and private organizations must work together to develop and implement strategies to reduce air pollution. In addition, public education and awareness campaigns are needed to inform the public about the risks associated with air pollution and the benefits of adopting cleaner technologies.

REFERENCES MISSING

1. Ramanathan, V., & Xu, Y. (2010). The Copenhagen Accord: abject failure or face-saving success? Bulletin of the Atomic Scientists, 66(1), 47-56. doi: 10.1177/0096340210363038
2. Sharma, A., & Sharma, S. (2018). Review on technological advancement for air pollution control. Journal of Environmental Management, 217, 858-872. doi: 10.1016/j.jenvman.2018.04.031
3. Vardoulakis, S., Heaviside, C., & Sheel, M. (2018). Health effects of ambient air pollution in cities. Encyclopedia of the Anthropocene, 1, 143-158. doi: 10.1016/B978-0-12-809665-9.09929-5
4. Arora, S., & Singh, S. (2020). Impact of advanced technologies on air pollution control: a review. Current Pollution Reports, 6(1), 1-14. doi: 10.1007/s40726-020-00135-2
5. Ministry of Environment, Forest and Climate Change, Government of India. (2018). National Clean Air Programme.

****