**AUTOMATIC AIR FRESHENER WITH CANISTER LEVEL SENSOR**

A Research Paper Proposal Presented to the Faculty of Technical-Vocational-Livelihood Information & Communication Technology Strand

Cielito Zamora Senior High School

In Partial Fulfillment of the Requirements for the

Subject Practical Research II

Quantitative Research

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**CHAPTER 1**

**INTRODUCTION**

**Background of the Study**

Every day people perceive different smells in the street, at work, on public transport, in the home. These smells can be pleasant and bring pleasant memories to mind, but sometimes they are unpleasant and tend to try to change that sensation. Society is faced with the need to neutralize these unpleasant smells wherever they are present. Specifically, Air freshener has focused on the space of the home, a place where people tend to spend a large part of their time. It has therefore been decided to develop a range of air fresheners for domestic use. An air freshener is a product that releases a scent to remove unwanted odors from a space for customer satisfaction, maximizing the scent of an air freshener in a space is of paramount importance (NURUL RIFHANI BINTI ROZANI, 2021). Air fresheners contain various chemicals that may or may not be harmful to human health and the environment. These products are widely used in different settings such as homes, schools, offices, and hospitals with ignorance of their real ingredients and their relative health effects (Fatima Ibrahim Alshaer et Al,2019).

Air freshener is an important aspect of most executive offices. Now-a-days, the air fresheners used are mainly based on the sublimation process or timer delay systems. The room freshener sachets and gel are kept open to emit a pleasant fragrance, and the timer-based systems do the same work periodically with the help of a mechanism installed in them. But they can be wasteful in a way because they unnecessarily sprinkle scent in the room, and they also have to be operated manually. This paper showcases the idea for the implementation of smart air fresheners by using sensors, which will detect the presence of a person and accordingly deliver fragrance to the surrounding area. It will also notify the user through an alarm when the scent container gets empty and remind them that a refill is required (Aditya Kandhare. et Al., 2020).

**Statement of The Problem**

The goal of this project is to design and implement an automatic air freshener system that not only dispenses fragrance efficiently but also incorporates a container level indicator to notify users when a refill is required.

Specifically, it seeks to answer the following questions:

1. How can the automatic air freshener with canister level sensor be evaluated by the teachers and students in terms of:

1.1 accuracy,

1.2 functionality,

1.3 ease of use, and

1.4 proximity area.

2. Is there a significant difference between the evaluation of the teacher and students in the automatic air freshener with canister level sensor?

**Hypotheses**

The following hypothesis are formulated by the researchers for this study:

**Null.** There is no significant difference in the evaluation of The Automatic Air Freshener with Canister Level Indicator, the following hypothesis will be tested at 0.05 level of significance

**Scope and Delimitation**

The scope of this research entails the design and development of an automatic air freshener system, incorporating a canister level indicator for enhanced user convenience. This involves creating a mechanism that can detect the level of the air freshener canister and convey this information to the user through a user-friendly interface. The focus will be on integrating sensor-based technology for accurate canister level monitoring while optimizing the system for energy efficiency to ensure prolonged battery life or sustainable power management, and it will also involve the use of surveys on teacher and students to determine the accuracy, functionality, ease of use, and proximity area.

The study will not involve usability tests to evaluate the system's effectiveness and ease of use including the specificity to a particular air freshener type or brand, potential variations in canister sizes and shapes. This study has economic constraints in the form of materials such as the availability of hardware that may impact the complexity of sensor technology and the usability tests' representativeness, limiting the scope in certain respects.

**Significance of the Study**

The result of this study will be beneficial to the following:

**The Office Workers.** A welcoming and pleasant-smelling environment can leave a positive impression on clients, potentially influencing business relationships.

**The Entrepreneurs.** An automatic air freshener with a canister level sensor benefits entrepreneur by, enhancing customer experience, enabling efficient resource management, offering customization, supporting data-driven decisions, and contributing to environmental sustainability.

**Future researchers**. To use as reference for evaluation in the actual field.

**Related Literature**

**Air Freshener**

Air fresheners are chemical products that have been used in the ﬁeld of environmental sanitation for decades M. Telpner (2016). These products are used in diﬀerent settings, including dwellings, hospitals, oﬃces, schools, hotels, restrooms etc. they are available in various forms such as incense, scented candles, oils, disks, aerosol sprays, electric diﬀusers, and gels. According to Jung et al, air fresheners are indiscrim-inately used to mask the eﬀects of the deodorizing and fragrant components in indoor enviroments. The main purpose of using air fresheners is to get rid of disturbing odours that may result from different activities or processes within an area. They may consist of several ingredients that have the ability to provide a pleasant ambience Y.-R. Jung, H.-H. Park, Y.-H. Oh et al.(2007).

According to Amra Bratovčić (2019)Fragrance compounds have been used since antiquity to fresh air and mask odours. For example, the ancient Egyptians were known to use musks and other natural materials to scent their tombs. Over the last 2,000 years a variety of compounds, including numerous spices and floral extracts, have been used for their ability to impart a pleasant aroma. However, the first modern air freshener was introduced in 1948. This product, using technology developed by the military to dispense insecticides, was a pressurized spray containing about 1% perfume, 24% alcohol or other solvents, and 75% chlorofluorocarbon (CFC) propellant. This was able to deliver a fine mist of fragrance that remained suspended in the air for a long period of time. This format of the product became the standard in the industry and sales grew tremendously. In the early 1950s, many companies began to add odour-counter-act ant chemicals to their formulas. These were chemicals that were intended to destroy or neutralize offensive odours, as opposed to simply masking them with fragrance.

Air freshener is a household product where it releases the chemical contains into the air and thereby are inhaled by the consumers which deliberately freshens up the mood of the person and refreshes the surrounding. An air freshener is a simple device that emits fresh and fragrant scent into the atmosphere from time to time. By sending out fragrance, the air freshener is able to cover up various types of appalling and disgusting smells, and thereby alleviates the uncomfortable feeling caused by the undesirable odor (Aditya Kandhare, 2020).

**Related Studies**

**Air Freshener**

Air fresheners are pervasive within indoor built environments, such as workplaces, schools, housing, transportation, hotels, hospitals, care facilities, and a range of private and public buildings. Air fresheners are designed to impart an aroma to the air environment or to mask odors, with the intent of creating a pleasing indoor space. However, despite the intent, air fresheners can emit and generate a range of potentially hazardous [air pollutants](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/air-pollutant) that can impair air quality. Even so-called green and organic air fresheners can emit hazardous air pollutants. Air freshener ingredients are largely unknown and undisclosed, owing to regulatory protections on consumer product ingredients and on fragrance formulations. In studies, fewer than ten percent of all volatile ingredients are typically disclosed on air freshener labels or [material safety data sheets](https://www.sciencedirect.com/topics/engineering/material-safety-data-sheet). From an indoor air quality perspective, air fresheners have been indicated as a primary source of volatile organic compounds within buildings. From a health perspective, air fresheners have been associated with adverse effects, such as migraine headaches, asthma attacks, mucosal symptoms, infant illness, and breathing difficulties. This article investigates the seeming paradox that products designed to improve the [indoor environment](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/indoor-environment) can pose unintended and unknown risks. It examines the science, health, and policy perspectives, and provides recommendations and research directions (Anne Steinemann. 2016).

With the ever-increasing population of people in every part of the world and also the presence of huge masses in various public places such as malls, hotels, restaurants, hospitals and in executive places etc. It has become impossible for common people to stay in these places for a longer period of time. The atmosphere of such places is not always pleasant because of various reasons. One such reason is the odor coming from different places and, even different types of people emit different odors into the atmosphere, along with pollution and many other substances in the air, making it impossible to provide a pleasing and affable surrounding for people (Aditya Kandhare,2020).

**Theoretical Framework**

**Automation and Control Theory**

This theory is supported by Automation and Control which is Credited to A.D Rodić (2009). Automation theory seeks to explain the principles and methodologies behind designing and implementing automated systems. This field encompasses a broad range of concepts, including the modeling and design of systems to operate with minimal human intervention, the study of control theory for maintaining stability and efficiency, and the integration of feedback loops to continuously monitor and adjust system performance. Decision-making processes, synchronization of components, fault tolerance strategies, and optimization techniques are also integral aspects of automation theory. Moreover, the discipline addresses human-machine interaction, focusing on designing interfaces and interactions between automated systems and human operators for effective collaboration.

Many roles for humans in industrial processes presently lie beyond the scope of automation. Human-level pattern recognition, language recognition, and language production ability are well beyond the capabilities of modern mechanical and computer systems. Tasks requiring subjective assessment or synthesis of complex sensory data, such as scents and sounds, as well as high-level tasks such as strategic planning, currently require human expertise. In many cases, the use of humans is more cost-effective than mechanical approaches even where automation of industrial tasks is possible.

Automation is the use of control systems (such as numerical control, programmable logic control, and other industrial control systems), in concert with other applications of information technology (such as computer-aided technologies [CAD, CAM, CAx]), to control industrial machinery and processes, reducing the need for human intervention. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist them with the muscular requirements of work, automation greatly reduces the need for human sensory and mental requirements as well. Processes and systems can also be automated.

**Conceptual Framework**

**Figure 1. Design and Engineering of Automatic Air Freshener with Canister Level Sensor using Automation and Control Theory**

The framework was used to show the Design and Engineering considerations of the Automatic Air Freshener. The model that is provided showed the general structure and guide for the study. To understand this study, the researchers are planning to determine the Design and engineering of the Automatic Air Freshener with Canister level sensor on the respondents which are the students and teachers of Cielito Zamora Senior High School



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**Definition of Terms**

The following words are conceptually and operationally defined for the better understanding of the study:

**Accuracy** refers to the correctness of a single measurement. Accuracy is determined by comparing the measurement against the true or accepted value (Helmenstine, Anne Marie, Ph.D. 2020).

**Air Freshener** is a substance or device that makes a room smell pleasant (Cambridge Dictionary).

**Automatic** is having controls that allow something to work or happen without being directly controlled by a person (Merriam-Webster).

**Canister** is a often cylindrical container for holding a liquid (Merriam-Webster).

**Design** it consists of the steps a programmer should do before they start coding the program in a specific language (press.rebus.community).

**Ease** **of** **use** A metric of satisfaction in using a product as established by one or more individuals using the product ([NIST SP 800-152](https://doi.org/10.6028/NIST.SP.800-152)).

**Fragrance is** a sweet or pleasant smell (Cambridge).

**Functionality** is how well it does the job it’s meant to do (Vocabulary).

**Install** is to put a machine into position and make it ready to use

**Level** **Indicator** is a device that is used to verify the liquid in the container (Law Insider).

**Proximity** **area** is the state of being closeness in distance and time (Cambridge Dictionary).

**Refill** is a replacement for a substance in a permanent container (Collins Dictionary).

**CHAPTER 2**

**METHODOLOGY**

This chapter deals with the procedures and techniques used by the researchers in

completing the study. It includes research design, population and sampling,materials and

procedure, data gathering procedure and data analysis.

**Research Design**

In this study, the researcher used a descriptive survey method for the research design to identify what design and engineering considerations are necessary to create an automatic air freshener with canister level sensor, the researchers will gather data on the selected teachers and students in each strand as the respondents observe the product, the reasearchers goals is to sucessfully apply the Canister Level Indicator on the Automatic Air Freshener

**Sample And Sampling Procedure**

The target population of the study is the teachers and the students inside of Cielito Zamora Senior High School who were enrolled in the academic year 2023-2024 with a population size of 843, the researchers considered only a sample of 30, 15 students and 15 teachers as they provided the data that would be needed. Additionally, the researchers used a convenience sampling technique.

**Sources of Data**

The survey guide is adapted from Legesse Adane et Al (2014), “Degree of utilization of air fresheners”. The researchers will do as much survey as the primary tool on gathering the data that is needed. The survey questionnaire has three parts: the first part is about how easy is it to use the product, the second part is about the accuracy of the product, and the last part is about the product overall functionality and proximity area.

**Data Gathering Procedure**

The researchers will give a consent letter to the students and teachers respondents, then the survey questions from different sources, the respondents will be given an allotted time to observe the protoype shown by the researchers, and after the students and teachers finish observing the prototype they will continue to answer the survey that is given by the researchers.

**Data Analysis**

Descriptive statistics, including frequencies, percentages, mean, median, mode, and range will be implemented to present and summarize the data gathered. T-tests for independent means will also be presented because the researchers will be gathering data from teachers and students. These statistics will offer an overview of participants’ responses, allowing for a more understanding about their own perspective.

This data analysis aims to gather patterns and relationships from the quantitative data collected by the researchers performing t-test for weighted means to analyze the means score given by the teachers and students to determined if there is a significant difference in the evaluation between the two groups and contributing to the understanding of the design and engineering of the Automatic Air Freshener With Canister Level Sensor. The t-test for independent means shall be used to provide that the data are normally distributed. According to Bhandari (2023), the weighted mean is a type of mean that is calculated by multiplying each data set value, adding up weighted numbers and dividing the sum of the weights.

The formula of the weighted mean is as follows: =

Where, = weighted mean

n = number of data points to be averaged

fx = summation of the product of values of items with their corresponding frequencies

To determine the significant difference between the evaluation of teachers and students, this study used T-test. According to Yim (2010) A T-test is a type of statistical test that is used to compare the means of two groups. It is one of the most widely used statistical hypothesis tests in pain studies

The formula of the T-test is as follows:

Where = Student's t-test

= mean

theoretical value

= standard deviation

= variable set size

**Ethical Considerations**

To align with the fundamental principles of ethical research, the Automatic Air Freshener with Canister Level Sensor study prioritizes the rights, privacy and well being of each participants. The ethical considerations that are is the research design is important for upholding the validity and truthfulness of the study and its findings.

Voluntary Participation : Participating in this study is entirely voluntary, it means that individuals have the freedom to decide whether to take part of the study or not. This principle ensures that all of the participants engage on the study willingly, without any form of coercion, and can withdraw anytime without facing any type of consequences.

Informed Consent : Participants of the study will be provided with an in depth information about the purpose of the study, the procedures. Informed consent will be sought, affirming that participants agree and understand to the terms, thus showing respect and transparency towards the autonomy.

Confidentiality : To keep the identity of the participant safe and secured, the data collected in the survey will be anonymous, and the confidentiality will be maintained and kept throughout the process of research. This ensures that every individual responses cannot be traced back to any specific participants, this ensures safety, trust and security.

Results Communication : The results of this study will be communicated responsibly and transparently. The researchers will strive to present their findings on the data that is collected accurately and transparently without misrepresentation. Participants will also be offered the option to receive the summary of the results, fostering a relationship between participants and the researchers.

By following these ethical considerations, the Automatic Air Freshener with Canister Level Sensor aims to conduct a responsible, respectful and truthful investigation, acknowledging the significance of ethical principles in maintaining the trust of participants and truthfulness and credibility of the study.

**References**

Legesse Adane et Al. (2014). *“*A Survey on Awareness of Consumers about Health Problems of Air Fresheners *https://www.idosi.org/wasj/wasj32(5)14/19.pdf*

Karen D. Dominguez “Air Freshener: Are they safe?” https://www.poison.org/articles/air-freshener-171

Anne Steineman (2017) “Ten questions concerning air fresheners and indoor built environments”

https://www.sciencedirect.com/science/article/pii/S0360132316304334

Aditya Kandhare et Al (2020) “Automatic Air Freshener With Sensor”

[www.ierjournal.org](http://www.ierjournal.org)/ 79-81-converted

Fatima Ibrahim ALshaer et Al (2019) “Qualitative Analysis of Air Freshener Spray”

<https://doi.org/10.1155/2019/9316707>

Anne Marie Helmenstine,Ph D. (2018)

https://www.thoughtco.com/definition-of-accuracy-in-science-604356#:~:text=Accuracy%20refers%20to%20the%20correctness,the%20center%20of%20a%20bullseye.

**APPENDICES**

Appendix A

Letter of Consent

Date:

Dear Respondents:

Greetings!

We are students of Grade 12 Python under the strand of Information Communication Technology of Cielito Zamora Senior High School conducting research entitled “Automatic Air Freshener with Canister Level Sensor”.

We would like to ask you to be interviewed as part of our study at your most convenient time. Your response will be recorded and we will make sure that your information will be kept safe and confidential.

Thank you very much for your time.

Yours truly,

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Noted By:

ANGEL LYN A. LACERNA

PR 2 TEACHER

Appendix B: Interview Guide Questions

Name (Optional) : Date:

INSTRUCTION: To answer this question you need to respond to each question truthfully and accurately as you can by putting a check on the numbers based on your experience.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QUESTIONS** | 1 | 2 | 3 | 4 | 5 |
| Utilization of air freshener in offices  Yes  No |  |  |  |  |  |
| Frequency of utilization of  air fresheners/day  Once (in the morning)  Whenever unpleasant comes to office  Twice (morning and afternoon)  Once (in the afternoon) |  |  |  |  |  |
| The amount of products do use monthly  300ml  < 300ml  600ml  >600ml  Others |  |  |  |  |  |

|  |  |
| --- | --- |
| **Variable** | **frequency(n)** |
| Do you advise others to use air fresheners in their offices  Yes  No |  |
| Opinions on using air fresheners  Strongly Agree  Agree  Neutral  Disagree  Strongly Disagree |  |

**Source:**

Legesse Adane et Al. (2014). *“*A Survey on Awareness of Consumers about Health Problems of Air Fresheners *https://www.idosi.org/wasj/wasj32(5)14/19.pdf*