B.M.S. COLLEGE OF ENGINEERING

(Autonomous college under VTU)

Bull Temple Rd, Basavanagudi, Bengaluru, Karnataka-560019

2023-2025

Department of Computer Applications

Report is submitted for fulfillment of Design Thinking Lab record in the subject

"Design Thinking"

(22MCA2PWDT)

By

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Under the Guidance of

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B.M.S. COLLEGE OF ENGINEERING

(Autonomous College under VTU, Approved by AICTE, Accredited by NAAC)

DEPARTMENT OF COMPUTER APPLICATION

(Accredited by NBA for 5 years 2019 - 2024)

LABORATORY CERTIFICATE

This is to certify that **Nishanth (1BM23MC061), Nishanth B (1BM23MC062), P Lakshmi Sowmya (1BM23MC063), Pareekshith N (1BM23MC064)** has satisfactorily completed the course of practical in **"Design Thinking – 22MCA2PWDT"** Laboratory prescribed by **BMS College of Engineering** (Autonomous college under VTU) 2nd Semester MCA course in this college during the year 2023 - 2024.

Signature of Batch in charge **Signature of HOD**

Dr. V Padmapriya Dr. Ch. Ram Mohan Reddy

Examiner:

1.

2.

ACKNOWLEDGEMENT

With great pleasure, first and foremost, we thank all the gracious people for their encouragement which gave us the strength to complete this project work successfully. We are grateful to BMS COLLEGE OF ENGINEERING for providing us a platform to carry out this project. We wish to thank our Professor Dr. V Padmapriya, for providing us an opportunity to work and supporting us in every aspect of the course.

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Content

INTRODUCTION

The primary ingredients of chalk dust are calcium carbonate and calcium sulfate. Exposure to chalk dust in work environments, such classrooms, can be extremely harmful to one's health. Although chalk dust is a frequent consequence of conventional teaching techniques, its potential health risks are frequently overlooked. Acute exposure can result in symptoms including coughing, wheezing, and pain in the airways as well as instant irritation of the eyes, skin, and respiratory system. Chalk dust can cause severe symptoms, including asthma attacks, in people who already have pre-existing diseases like asthma, making breathing difficult. High chalk dust exposure over an extended period of time has been connected to more severe health issues, including persistent respiratory issues and even lung damage. Allergic responses, such as itching and rashes on the skin,

ABSTRACT

The Smart Hand Duster, which combines cutting-edge design with clever features to maximize dust removal in a variety of settings, marks a substantial improvement in cleaning technology. To improve user experience and cleaning productivity, this gadget incorporates dust particle identification, ergonomic handling, and adaptive cleaning processes. The Smart Hand Duster lessens the amount of physical labor needed and enhances overall cleaning outcomes by automating parts of the dusting process and offering tailored solutions for difficult-to-reach locations. This study examines the main characteristics, advantages, and possible uses of the Smart Hand Duster, highlighting its significance in transforming contemporary cleaning procedures.

PROBLEM STATEMENT

Chalk dust is one type of dust that frequently accumulates in classrooms, which can cause respiratory problems, allergic reactions, and other health problems for both teachers and pupils. Conventional dusting techniques are not just physically taxing and ineffective, especially when it comes to cleaning regions that are difficult to access. Furthermore, the health risks that fine dust particles in learning environments represent are not adequately addressed by conventional dusters. A more intelligent, effective cleaning approach that lessens physical strain and enhances classroom air quality is required. In order to satisfy these demands, the Smart Hand Duster was created. It offers a wearable, user-friendly, and health-conscious method of keeping classrooms tidy and secure

KEY STAKEHOLDERS :

Students: Most affected by dust exposure, particularly those with respiratory issues like asthma, which can impact their health and learning experience.

Teachers and Staff: Constant exposure to dust affects their health and ability to provide a productive learning environment.

School Administrators: Responsible for ensuring classrooms are clean and safe, while managing resources efficiently.

Janitorial and Cleaning Staff: Directly involved in cleaning, they face the physical strain of traditional methods and potential health risks from dust exposure.

ROLES

1. **Nishanth B**

   Research Guide for Product Design: Provides guidance on the overall design process and ensures the product meets the necessary requirements.

2. **Nishanth**

   Product Low-Level Designer: Handles the technical details of the design, working on specific features and components of the product.

3. **Lakshmi Sowmya**

   Resource Collector: Gathers and organizes the materials and resources needed for the product's development.

4. **Pareekshith N**

   Product Implementer: Oversees the actual creation and assembly of the product, making sure the design is brought to life properly.

CHALLENGES

- **Durability:** Ensuring the glove withstands frequent use without wear and tear maintaining its functionality over time.
- **User Comfort:** Designing the glove to be eigonomically comfortable, preventing discomfort or strain during extended use.
- **Scalability:** Adapting the product for different market sizes and uses while maintaining quality and performance and only suitable for office and educational institutions.
- **Maintenance:** Developing a design that allows for straightforward detachment and cleaning to uphold hygiene standards and ease of maintenance.

PAIN POINTS

- **Ergonomics**: Potential physical strain or discomfort during extended use.
- **Hygiene**: Researchers and herbalists who validate and contribute scientific and traditional knowledge on plant medicine.
- **Design**: Possible bulky design leading to inconvenience in use and suitable only for left handers .
- **Upkeep**: Challenges with maintaining the product, including ease of cleaning and regular maintenance.

SWOT ANALYSIS

- STRENGTH:
    1. Multi-functionality:
       Combines dusting and presentation tool, work statistics used in education institutions

    2. Portability:
       Compact design can be easily carried around useful for professional who moves between different locations.

- WEAKNESS:
    1. Complexity:
       Implementing multiple features like Aurdino , Lazer etc., it might become complex for the users.

    2. Durability:
       More components might lead to higher chances of malfunction or wear and tear

- OPPORTUNITY:
    1. Efficiency:
       Smart features like Strain sensors can be marketed as tools to improve cleaning efficiency

    2. Branding and Customization:
       Institution can customize the Duster with their Logos or names enhancing their Brand identity
- THREAT:
    1. Product Lifespan:

       Concerns about Durability and longevity of the Product might discourage institutions from investing in it.

    2. Consumer acceptance:

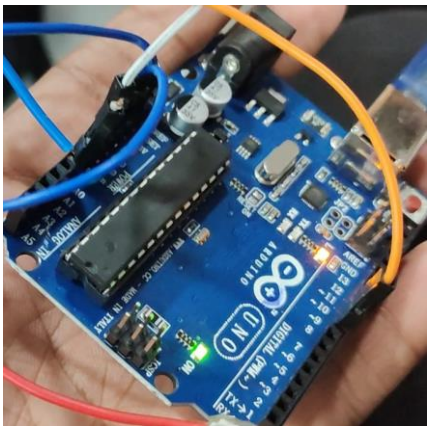
       Market adoption might be slow due to unfamiliarity with the product’s multifunctional nature, and users might separate tool

PROTOTYPING

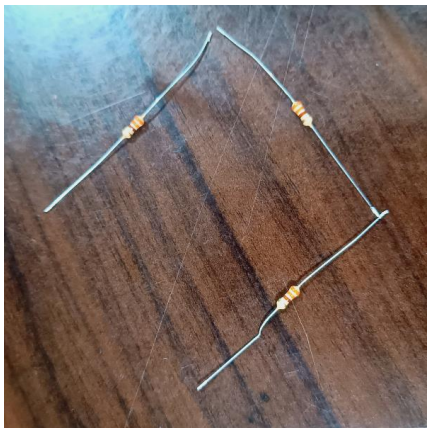
LOW FIDELITY PROTOTYPE

HIGH FIDELITY PROTOTYPE:

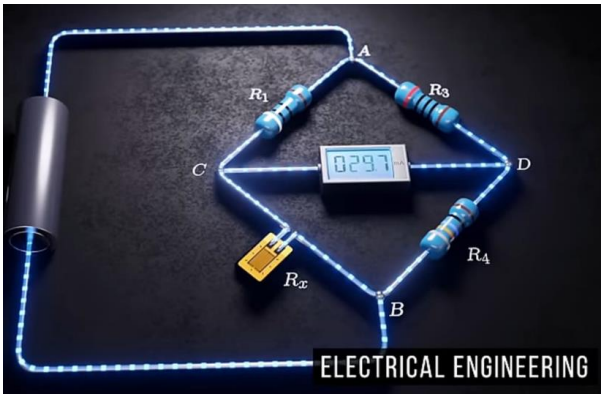
COMPONENTS USED:



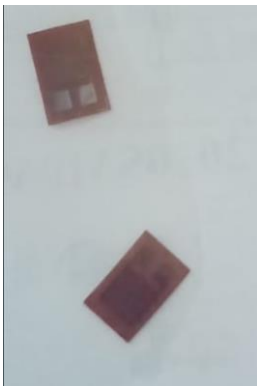
AURDINO UNO



330 OHM RESISTOR



WHEATSTONE BRIDGE



STRAIN GAUGE SENSOR

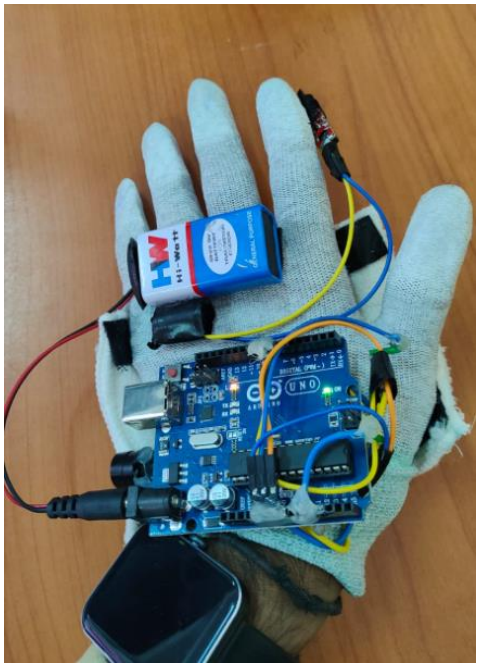
LAZER POINTER

BUZZER

HW BATTERY

GLOVES

INTEGRATED MODEL:



BACKVIEW

FRONTVIE

LIMITATIONS

There are a number of issues with the Smart Hand Duster that could hinder its uptake. Some people may find it difficult to operate due to the advanced smart features' complexity. Because it runs on batteries, it limits usage time and necessitates frequent charging, which leads to battery dependency. Since the initial cost is probably more than that of conventional dusters, users on a tight budget might be discouraged. Furthermore, little market awareness of its advantages may make market penetration difficult. Finally, the smart components' ongoing maintenance requirements may deter regular use.

FUTURE ENHANCEMENT

The Smart Hand Duster's functionality and user experience can be greatly enhanced with future improvements. The incorporation of sophisticated health monitoring capabilities, including sensors that identify allergens in the surroundings, is one encouraging path. This would enable the gadget to offer consumers individualized health insights, assisting them in determining their exposure levels and implementing the appropriate safety measures. Improving dust collection effectiveness is also essential, as is adding real-time feedback to let consumers know how well they are cleaning. Ultimately, optimizing energy consumption will increase the device's sustainability and prolong battery life, making it a more environmentally responsible option for users. When combined, these improvements help establish the Smart Hand Duster as a cutting-edge option for more effective and healthful cleaning.

CONCLUSION

The Smart Hand Duster stands out with its advanced, ergonomic design and real-time feedback capabilities, offering efficient cleaning. However, its cost and maintenance requirements present challenges. Opportunities for market growth and tech enhancements exist, though competition and user resistance could pose obstacles. Addressing these issues effectively will be key to its success in the cleaning industry.